

# The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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## Blowing Engines for French Iron Works.

According to the London *Engineer*, to which we are indebted for the engravings accompanying this article, English engineering firms have of late received a considerable amount of work from France, and French contracts for locomotives and heavy stationary engines have been executed by several leading firms. The accompanying illustrations are from working drawings for a pair of compound high and low pressure condensing blowing engines for high furnaces, which have been constructed by an English firm for the Société Anonyme des Mines de Fer de l'Anjou et des Forges de St. Nazaire, near Nantes, France. These engines have been constructed from French designs, and except that in construction they are built with greater strength than similar engines made in France, they may be taken as fairly good representative

air pump in connection with the low-pressure cylinder has a diameter of 30 inches, a stroke of 3 feet, and is fitted with gun-metal liner, foot and delivery valves. Figs. 3 and 4 (page 3) and 5 and 6 (page 5) represent plans of the engines at different points, and, taken in connection with the particulars above given, will clearly explain their general arrangement.

### Competitive Trial of Stone Breakers.

The Meriden (Conn.) *Press-Recorder* of May 31 gives the following account of a competitive trial of a Gates against a Blake-Marsden crusher:

The scene at the time of the trial was very interesting. The quarry is in one of the most picturesque spots within the town, albeit the ravages of the Carpenter Brothers, in their insatiable search for rock, have torn the front off one of the hills, giving it a wild and devastated appearance as it presents

in readiness for the trial, and half a dozen brawny men stood ready to feed the flinty food into the iron jaws of the giant. Capt. Heber Squier, the representative of the Gates Iron Works, was on hand to superintend operations. The machine was started up, time was called, a mass of rock was poured with a roar into the mouth of the monster, and the fun began. The iron jaws were not given a moment's rest. Every chink and opening that appeared was promptly filled, and the rock was fairly crowded in. Some one ventured the opinion that the machine would be clogged or checked by crowding it so, but the perspiring captain only smiled and jammed in another chunk the size of a boulder. The machine never for an instant let up on its steady motion. It seemed to be perfectly irresistible, and its huge jaws might have been properly labeled, "Abandon hope, all ye who enter here." With the steadiness of a pendulum the machine received, crushed and

factory, Meriden; P. Callanan, a contractor of South Bethlehem, N. Y.; J. S. Lane, road master of the Hartford division of the N. Y., N. H. and H. R. R.; Simon Ingersoll, president of the Ingersoll Mfg. Co., Stamford, Conn.; Isaac Skidgell, official boiler inspector of Meriden. After the contest they met and signed the following report:

MERIDEN, CONN., May 30, 1883.

The committee met at the quarry of the Messrs. Carpenter Brothers, on the above date, to investigate the merits of a 9 x 14 Gates ore crusher, and a Blake crusher, with Marsden's improvements, 9 x 15. The Gates crusher was first run with the following result:

Amount of stone crushed, yards..... 9  
Time used in crushing, minutes..... 20½

The Blake crusher was then run with the following result:

Amount of stone crushed, yards..... 9  
Time used in crushing, minutes..... 6¼

The crushers received and discharged the

appears to be no reason why slag should not be utilized for ornamental purposes, seeing that it is produced in nearly all colors, and the cost would be trifling. Slags from hematite ore, containing a certain proportion of manganese, give the tint of the amethyst in the vitreous parts, but by certain means that color is made to disappear and is replaced by a pearly white pumice one. Under different conditions the same furnaces give a slag of a dark green color. There are nearly all shades of blue and green, and there are light greens as well. An opalescent slag is usually found where there is a considerable quantity of alumina in the ore, while the ores of the coal measures give an alternation of shades, with dark green or blue stripes, sometimes running into one another, while an excess of lime gives a slag of a dull stony character. With protoxide of manganese, found in considerable quantities in spathic ores, in some instances to the extent of from 3 to 10

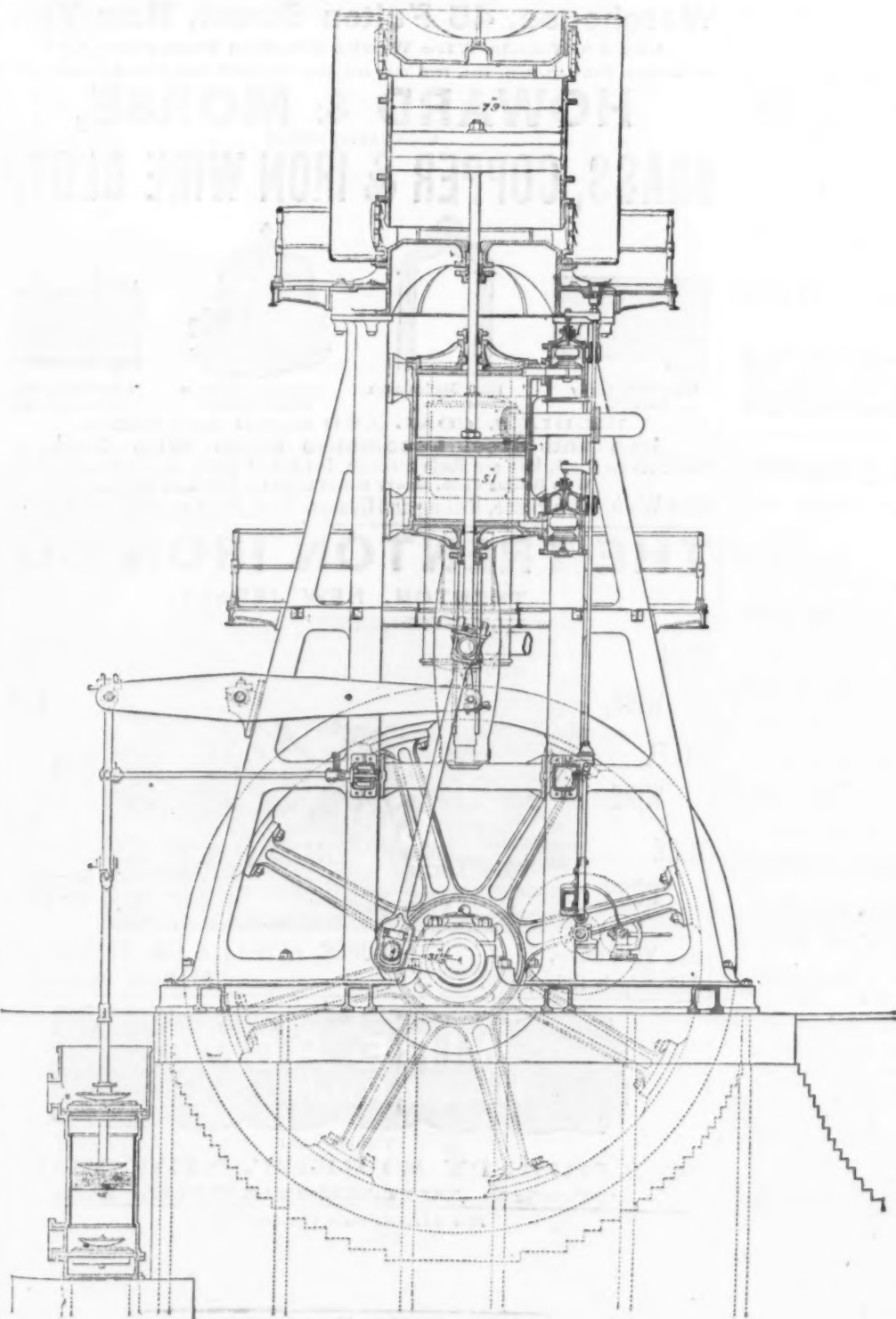


Fig. 1.—Front View.

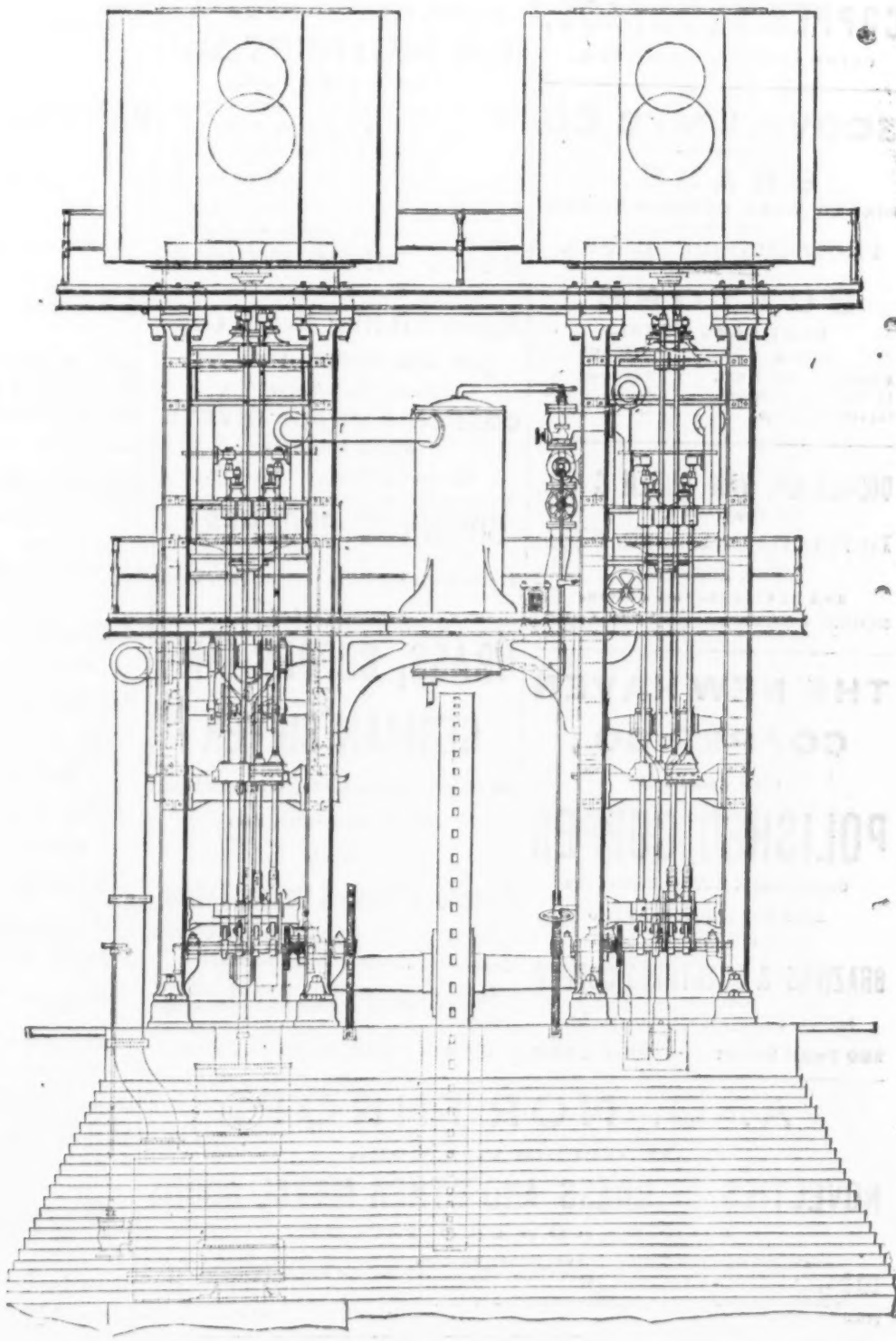


Fig. 2.—Side View.

## BLOWING ENGINES FOR FRENCH IRON WORKS.

types of French ideas. They consist of two vertical engines, the one having a high-pressure cylinder 32½-inch bore, the other a low-pressure cylinder 51-inch bore, with the respective piston-rods each connected to blowing cylinders having a 70-inch bore, and both steam and blowing pistons have a stroke of 5 feet 3 inches. The engines are so constructed that one can be disconnected from the other, and, in the case of the high-pressure, worked as an independent high-pressure engine, while the low-pressure engine can be worked as a condensing engine, the steam in this case being reduced by a suitable reducing valve. On the intermediate pipe connecting the high and low pressure cylinders is fixed an inter-heater having a surface of 425 square feet. The steam valves are on the Cornish system, the exhaust valves of both cylinders having a constant lead and lift. The inlet valves are controlled by means of special trip gear, designed by the builders for cutting off the steam from every point, ranging from .1 to .8 of the stroke. The

its torn and jagged surface to the relentless blows of the blasters. The hill seems to be one solid mass of trap rock, which sometimes crumbles under the persuasion of a crowbar, and then yields only to the persistent pounding of steam drills and the penetrating power of gunpowder. Over the face of the ledge yesterday a hundred or more men were scattered, industriously picking chunks of rocks for the crushers, rattling and crunching below. The hills echoed with the sounds of the breaking rock and puffing engine, adding to the impression of energy and strength gained by watching the work in progress.

A good many spectators were present at the contest yesterday, including Mayor Doolittle and prominent contractors both from this and other cities. The watch was held first over the Gates crusher, time to be given when a carload, or nine yards, of rock crushed to the size used in ballasting had been finished. The empty car was rolled under the discharging trough of the machine, an immense pile of great chunks of rock was

discharged the rock, while the captain and his stalwart crew sweated and toiled, and the spectators wondered and applauded. In exactly 20½ minutes the car was full of the broken rock and the stone-stuffers ceased their labors. The contractors looked pleased, but the captain was radiant. The machine had performed its work half a minute quicker than he had predicted. "I will give the Blake-Marsden machine 65 minutes to do the same work," he said. The rival crusher was then started up and three or four men crowded the rock into it to its fullest capacity. The question as to which machine would win was settled in two minutes. The amount discharged into the car was very meager compared with the volume that had poured out of the Gates crusher. The crowd began to thin, all expectation of a close contest being ended. The captain proved a close guesser, for it took the Blake crusher 64½ minutes to do the same work.

The committee who had charge of the contest was composed as follows: W. W. Wright, of the Bradley & Hubbard manu-

same sized stone, and same kind of stone. The machines were run from the same shaft. [Signed by the Committee.]

### The Slag Industry.

Under this head an English paper states that there are now machines in operation in Great Britain that will turn out from 10,000 to 12,000 slag bricks per day. These bricks are described as being strong, perfectly uniform in size and requiring less mortar than ordinary bricks. The molten slag is run into molds direct from furnaces ranged round a rotary table, or by grinding the material and mixing it with sand, and then pressing. Both bricks and slabs are found well adapted for railway platforms, buildings of all kinds, baths, drainage pipes and roads, being more durable than ordinary stone. Besides dwelling upon the utilization of blast-furnace slag in the form of the well-known mineral wool, now so extensively used, the paper in question says that there

per cent., a violet color is produced, and yellow or dark green by proto-sulphide of manganese. A bright blue is met with in the Swedish slags, and looks well, and is attributed to various matters in the ores, probably sulphide of manganese. The colors of the slag, however, vary with their composition and the conditions under which the furnaces are worked, but the slags produced from furnaces with light burdens and making gray iron are usually white or gray. Where the burden, however, is heavy, and the temperature not so high, they are usually black, their vitreous character and fluidity increasing in proportion to the amount of silica in the ore. There is no difficulty found in getting the slag into a fluid state and casting it in molds. At present, however, the utilization of the slag, or blast-furnace refuse, as it is generally termed, is principally confined to the making of bricks, slabs, slag sand, shingle for concrete, paving blocks, mortar, glass bottles, and the fine slag wool, or silicate cotton, for which there is now a large demand.



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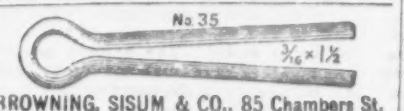
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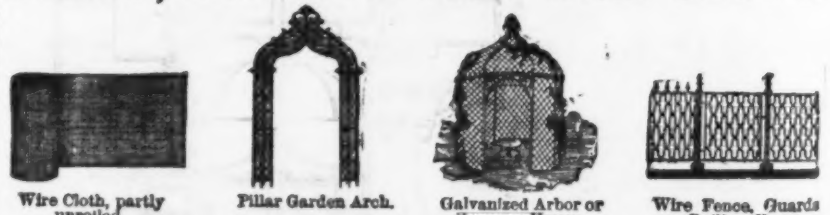
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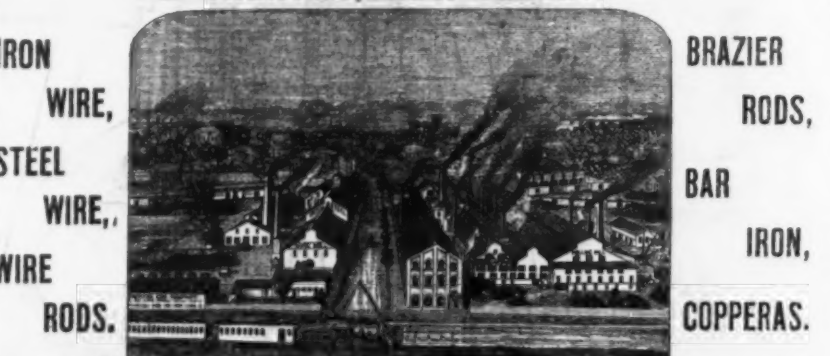
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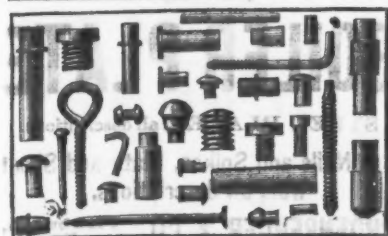


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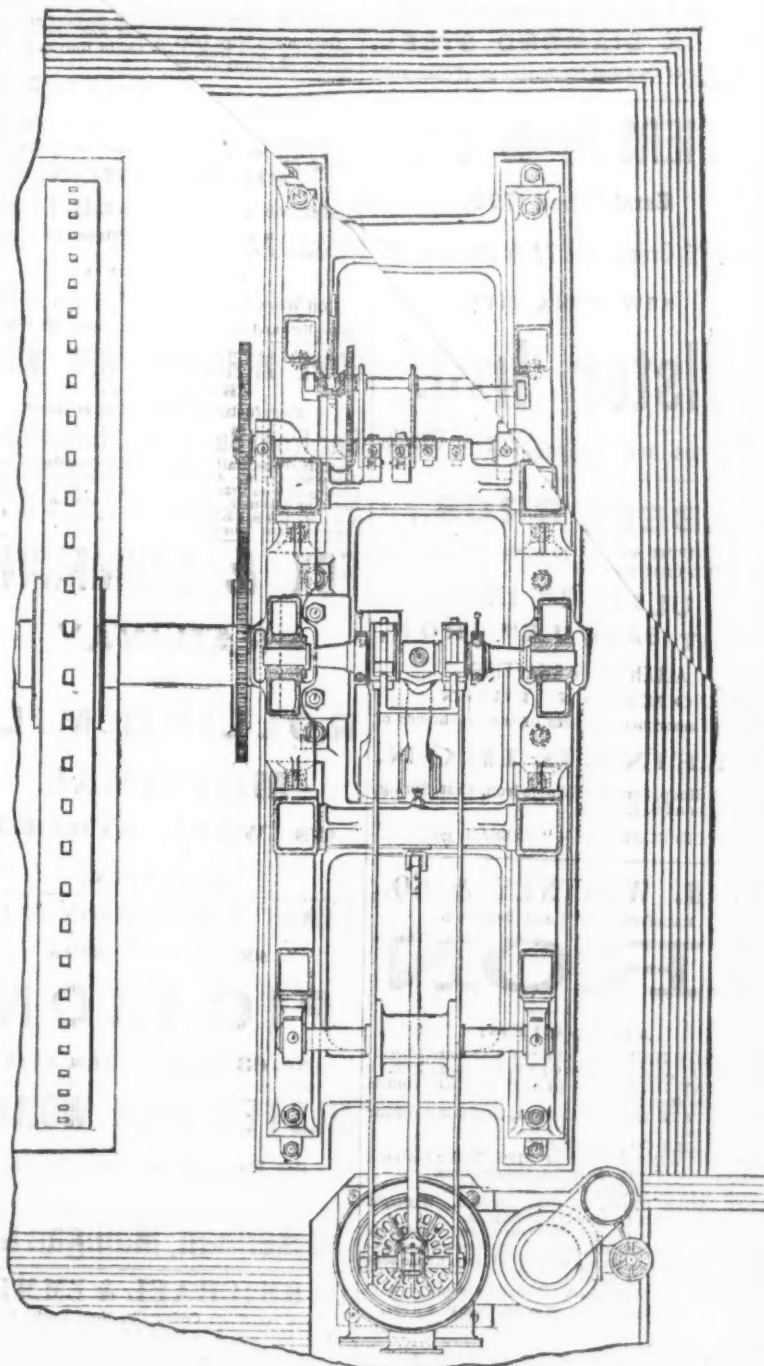
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**The Metal of the Future**

It is only a few years since glowing  
accounts were given in most of the technical  
journals of the discovery  
of aluminum was to be made for 25  
cents a pound. At that time we ex-  
pressed our doubts as to the value of the  
process and the success which had been

of manufacture to the test of criticism, to  
judge of the validity of the claims made in  
its behalf, but first will take the opportunity  
of giving the subject of aluminum—the  
metal of clay—a general consideration.

Aluminum, the metallic basis of clay, is  
even more widely disseminated over the sur-  
face of the earth than iron. It is one of the  
constituents of the minerals feldspar and



Blowing Engines for French Iron Works.—Fig. 3.—Plan and Section of Engine.

attained. The following article from the  
June number of the *Journal of the Franklin  
Institute* contains a report from the secre-  
tary upon this subject, in which he gives the  
result of his investigations concerning this  
new process. It will be observed that Dr.  
Wahl's conclusions are practically identical  
with those which we, from less accurate data,  
mica, of which the granites and gneisses are  
largely made up, and of the clays which result  
from the disintegration of these rocks. It  
exists in considerable quantities, also, in  
nearly all the so-called crystalline rocks, and  
the silicates of alumina in various combina-  
tions form the most numerous class of miner-  
als. Abundant as are the ores of this metal,

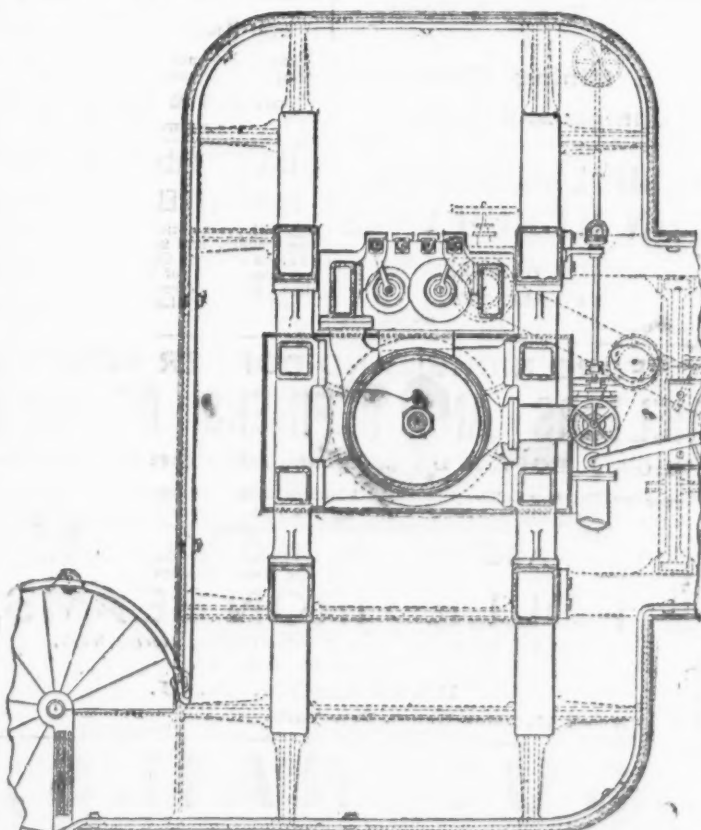


Fig. 4.—Plan of High-Pressure Steam Cylinder.

had reached. The report is of exceptional  
interest, and, like most of the Doctor's writ-  
ings, is very valuable to the practical man.  
The technical papers for the past month  
or two have been full of accounts of a new  
process for manufacturing the metal alu-  
minum, said to have originated in England,  
and by which, it is affirmed in very positive  
terms, the price of this metal has been re-  
duced from \$5000 per ton to \$500, or to  
about 25 cents per pound. I shall in the  
proper place subject this alleged new process

it is one of the most difficult to reduce.  
Shortly after the discovery, near the begin-  
ning of this century, by Sir Humphrey Davy,  
that the so-called earths—soda, potash, lime,  
alumina, &c.—were metallic oxides, and not  
simple bodies, as had hitherto been supposed,  
and his demonstration of the fact by isolat-  
ing the metals sodium and potassium with  
the aid of the then newly discovered galvanic  
battery, repeated attempts were made also  
to isolate aluminum, the metal of clay, but  
unsuccessfully, until at length, after many



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failures, the efforts of Wöbler were crowned  
with success in the year 1817. The prop-  
erties of the new metal were found to be so  
remarkable that the attention of chemists  
was at once attracted to the subject of its  
production; but the metal obstinately re-  
sisted all efforts to produce it in quantity  
until the year 1854, when St. Claire Deville  
solved the problem measurably by reducing  
the metal from anhydrous chloride by reduc-  
tion with metallic sodium. It was thought  
then that the successful solution of the prob-  
lem of producing aluminum on the com-  
mercial scale would speedily bring about a revo-  
lution in the metallurgical world. But though  
nearly 30 years have elapsed since that time,  
aluminum is still, by reason of its high price,  
ranked among the more precious metals, and  
is consequently debarred from competition  
with copper, zinc, tin, iron and steel for the  
numerous industrial uses for which it is well  
adapted by reason of its many admirable  
and unique qualities. What these are will  
appear from the following brief rehearsal:

The metal aluminum has a grayish-white  
color, between that of zinc and tin; it is  
exceedingly light, being only two and a half  
times heavier than water—that is, about  
three and a half times lighter than copper,  
four times lighter than silver, and nearly  
eight times lighter than gold. It is remark-  
ably sonorous, giving out a very clear musical  
tone when struck; it is very unchangeable  
in the atmosphere, surpassing in this respect  
most of the baser metals—iron, copper, &c.,  
and resembling the precious metals silver  
and gold. It is very difficultly oxidizable,  
nitric acid (aqua fortis), which attacks and  
destroys nearly all the metals with the  
greatest energy, having little or no action  
upon it, and even the white heat of the  
furnace only suffices to oxidize it super-  
ficially. It has a tensile strength equal  
to that of copper, and conducts electric-  
ity nearly four times better than iron. It  
forms alloys with many of the metals, many  
of which have remarkable qualities. Of these  
alloys, those with copper—the so-called  
aluminum bronzes—are the most notable,  
being possessed of such valuable properties  
that their extensive adoption in the arts is  
only hindered by the one circumstance  
of their comparatively high cost.

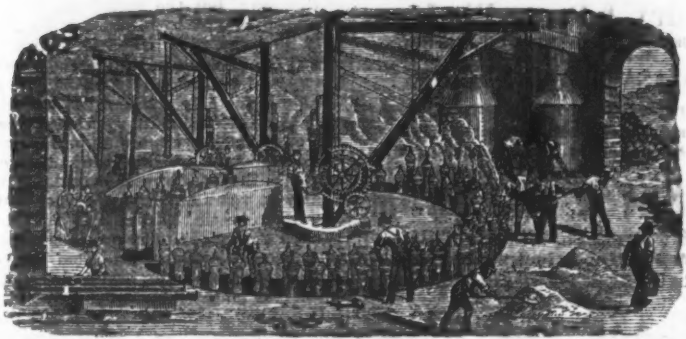
From the above brief résumé of the lead-  
ing characteristics of this remarkable  
metal, it will be apparent that a wide field  
would at once be opened for it in almost  
every department of industry, if once the  
problem of its cheap production were solved;  
and assuming the truth of the newspaper  
accounts respecting the alleged new process  
of producing it in England at 25 cents per  
pound, the statement that the invention  
would "effect important changes in the  
metal trade, not only in England, but  
throughout the world," is not in the least ex-  
aggerated. Unfortunately, however, the al-  
leged new process of Mr. Webster, of  
Hollywood, near Birmingham, which has been  
the recipient of a larger share of gratuitous  
advertising than any other patented process  
that has appeared for some years, will not  
bear a critical investigation. The process  
embraces two principal elements—the prepa-  
ration of an anhydrous chloride of alumi-  
num, or of a double chloride of aluminum  
and sodium, by a very tedious and round-  
about method, and from this chloride the  
metal is subsequently obtained by the use  
of sodium as a reducing agent.

I was greatly interested in getting at the  
details of this new process. Months before  
anything was published concerning it, it was  
whispered in scientific circles in England  
that the problem of the cheap production of  
aluminum had at length been solved. Even  
so eminent a luminary in the metallurgical  
world as Sir Henry Bessemer, in an address  
before one of the leading British engi-  
neering bodies, foreshadowed the an-  
nouncement of some remarkable discovery,  
and set all the scientific world agog with  
curiosity. At length, after some months  
of patient waiting, the technical journals  
of England announced the procedure of  
Mr. Webster with a grand flourish of  
trumpets, the American journals have  
taken up the refrain, and it appeared  
to occur to no one to subject the ex-  
travagant claims of the alleged improve-  
ment to the test of intelligent criticism. For  
myself, I cannot refrain from the state-  
ment that I was more than astonished that  
claims so grossly and palpably erroneous  
and exaggerated should have been permitted  
to pass unchallenged in the country where  
they originated, and which boasts of so many  
eminent authorities in metallurgy. The al-  
leged new process is almost a literal copy of  
the old, time-honored method introduced and  
practiced in France for the past 20 years.  
In the only important features—namely, the  
production of an anhydrous chloride, and the  
reduction of this by means of sodium—it is  
absolutely the same. The only features that  
can be called new relate to the method of  
treating the raw material, some convenient  
and cheap aluminous substance, and after  
reading Mr. Webster's patent specification, I  
am well satisfied that those portions of the  
process that are new are the only portions  
that are worthless.

All this may seem to be unnecessarily se-  
vere upon Mr. Webster, but in explanation  
I have to urge that when an inventor pub-  
lishes his invention with such extravagance  
of statement he must expect the most  
searching investigation of his claims. The  
utter absurdity of Mr. Webster's claim to be  
able to produce aluminum at a cost of  
£100 (about \$500) per ton, which would be  
equal to about 25 cents per pound, will ap-  
pear from the simple statement that to re-  
duce 1 pound of metal from the chloride re-  
quires, theoretically, very nearly 3 pounds  
of metallic sodium, and in practice nearer 4  
pounds than 3, and the cost of the sodium  
alone required for the reduction of a pound  
of the metal will be almost \$1, if not more,  
to say nothing of the tedious and costly  
preparation of the chloride. But I have said  
enough. Aluminum, I am satisfied, is the  
coming metal, destined one day to play as  
prominent part in the arts of civilization,  
perhaps, as iron, but after raising our ex-  
pectations to so exalted a pitch, Mr. Web-  
ster's much advertised solution of solving  
the problem of producing it cheaply forcibly  
recalls to memory, by the similarity of its  
descent from the sublime to the ridiculous,  
the old quotation: "Farturient montes, nar-  
cetur ridiculus mus."



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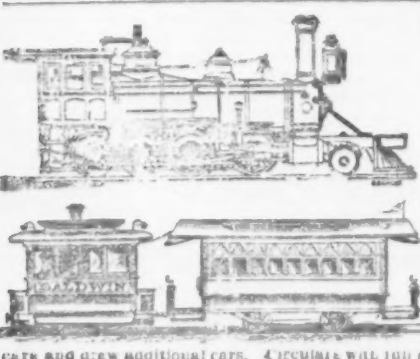
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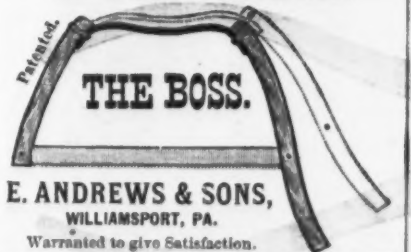


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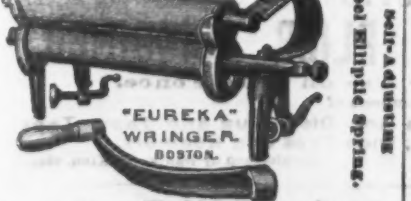
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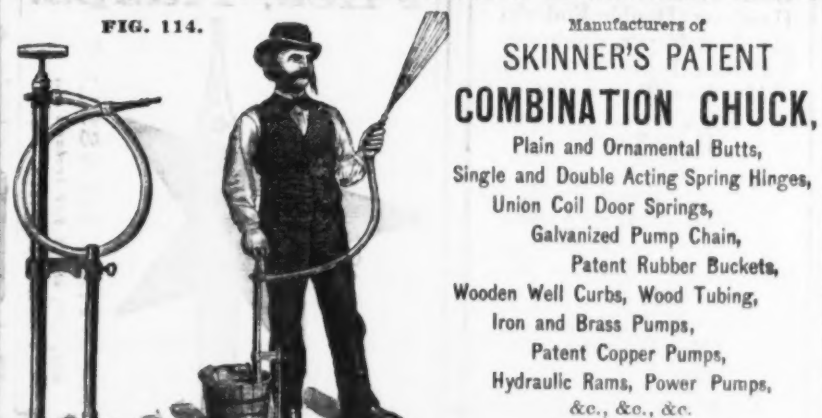
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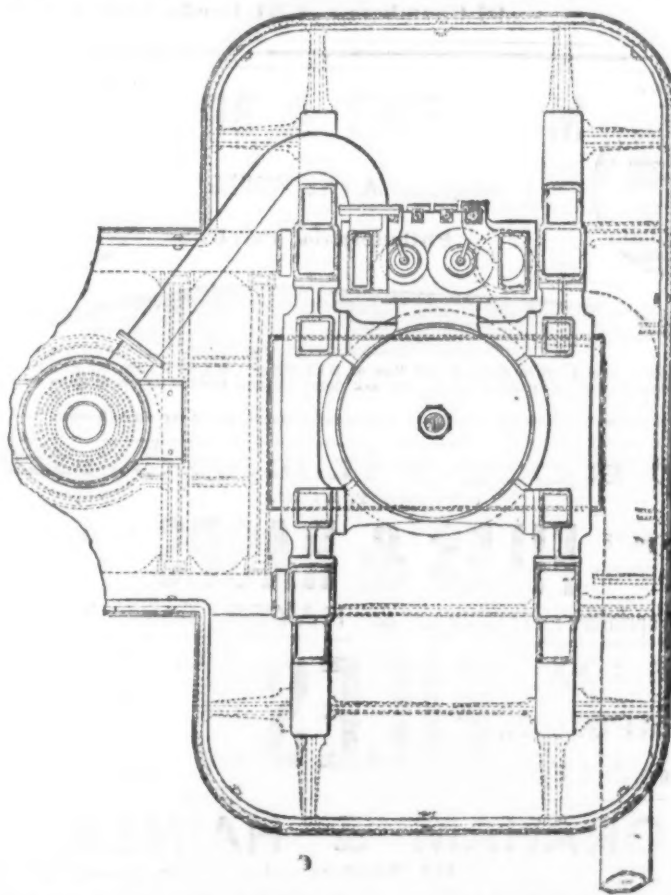
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### The Navy Yard Commission.

Secretary Chandler has received and considered memoranda furnished him by the Navy Yard Commission, of which Commodore Luce is president, concerning their report to Congress. He approves of their recommendations for the closing of certain yards and concentration of the organization and reduction of expenses in the remainder, and they will be ordered to take effect about July 15. The recommendations are as follows:

That there shall be reorganization and concentration of the mechanical department of every navy yard, so that there shall be

The commissioners recommend that the New York yard be retained as a first-class yard, but that no money shall be spent in the way of improvements, either in the yard or on the Cob Dock, until plans for its full development shall have been prepared and approved. These plans should include the improvement of Wallabout Channel and the utilizing of the Cob Dock for a wet basin. The report says New London should be dropped forthwith from the list of navy yards, and that naval station's stores and material of all kinds that can be made available sent to other yards. Some differences of opinion exist in the commission in regard to the disposition of the Boston and Portsmouth yards.



Blowing Engines for French Iron Works.—Fig. 5.—Plan of Low-Pressure Steam Cylinder.

one shop in each for the performance of the same class of work. The commission advise that the Pensacola yard be closed; that the Norfolk yard be retained in first-class condition; that the Washington yard be dropped from the list of navy yards and be designated as a naval arsenal, retaining it in full working condition for the manufacture of certain specified articles only under the Bureau of Equipment and Ordnance.

It is recommended that the League Island Navy Yard be closed, both as a yard and as a naval station, until plans have been prepared and approved for such a yard as the department requested authority to construct and Congress authorized, and until the fill-

All agree that the yard at Portsmouth would be indefensible against a serious attack from a fleet of ironclads armed with modern rifled ordnance, unless new and extensive fortifications could be erected, the cost of which would be so enormous as to preclude the consideration of such expedient. All agree that it would be difficult to overestimate the importance of the Boston yard in time of war, and that it should be so improved as to utilize the water frontage to the utmost extent, and that at the earliest moment. No expenditures for fortifications will be required for its defense beyond those demanded for the protection of the city itself. All agree that any proposal to dispose of this magnificent property cannot be too strongly

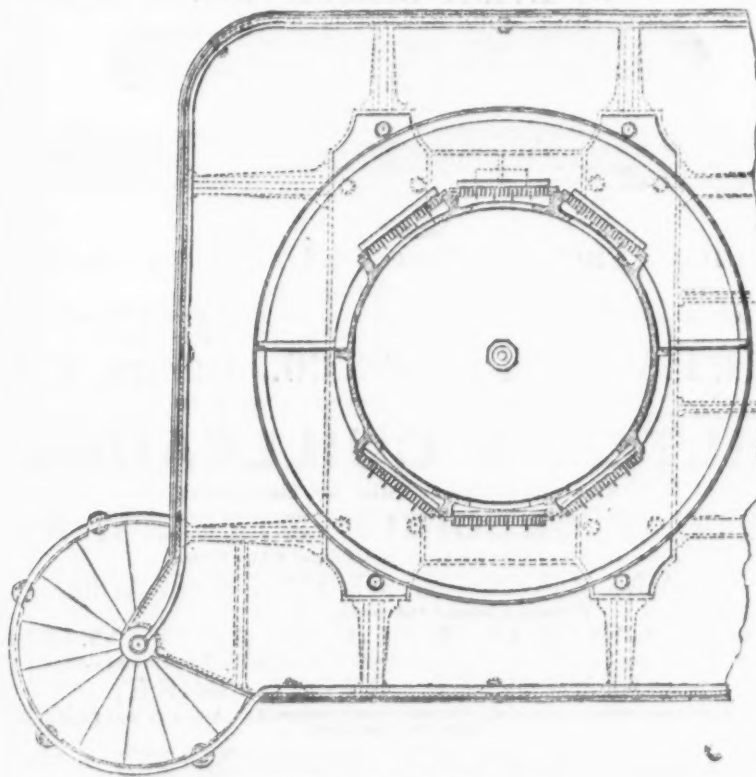


Fig. 6.—Plan of Blowing Cylinder.

ing and construction of the quay walls and gateways to the great ship basin in the back channel are completed. The present plans contemplate the construction of exactly what the department declared it did not want, viz., another similar yard to those it then possessed, whereas the department demanded a great iron-shipbuilding and iron-manufacturing yard only. This change of plan necessarily involves the expenditure of an enormous sum of money for purposes that are not required, as they exist in other yards, and which would therefore be unjustifiable. The commission consider the site too valuable and desirable to be abandoned, and do not believe similar or equal accommodations can be procured elsewhere at lower cost. They believe that no better locality than the Delaware River can be found for the purpose for which the site was selected, and therefore recommend the completion of this yard on the original basis; but they are also unanimously of the opinion that it is totally unfit for an ordinary or small yard, and that if the original plan is to be abandoned the island should be also.

condemned. They consider it of absolute importance that Mare Island Navy Yard be retained in full operation, as it is the only workshop of the Government on the West coast.

**Increased Efficiency of our Railroad System.**—Mr. William P. Shinn has prepared for the report of the Bureau of Statistics a statement upon the increased efficiency of the railroad system of the United States. This paper shows that in the three leading railroads of the country—viz., the New York Central and Hudson River; New York, Lake Erie and Western, and the Pennsylvania Railroads—the traffic increased during the decade ending 1880 from 2,682,603,465 ton miles in 1870 to 8,263,028,412 ton miles in 1880, or upward of 300 per cent. The means by which this enormous increase in traffic has been secured, Mr. Shinn attributes to the following causes: 1. Improved track, or "permanent way," including bridge superstructure. This is largely due to the adoption of steel rails. 2. Additional sidings and second, third and fourth tracks.



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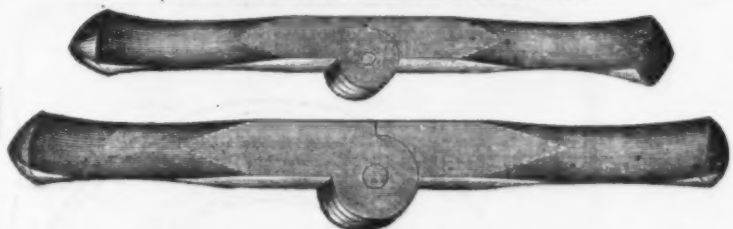
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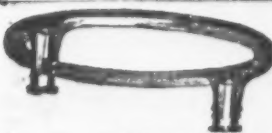
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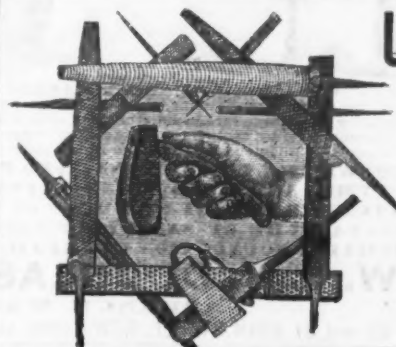
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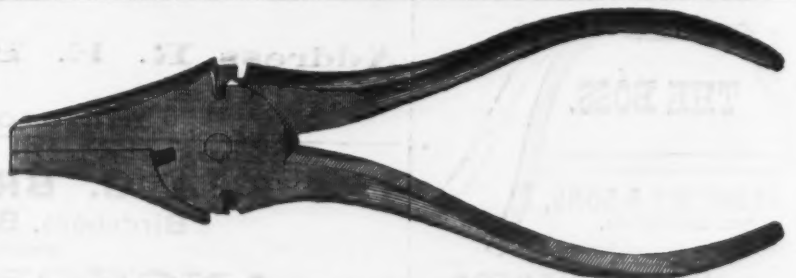
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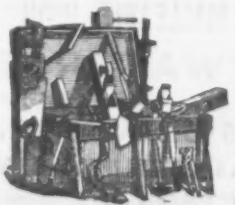
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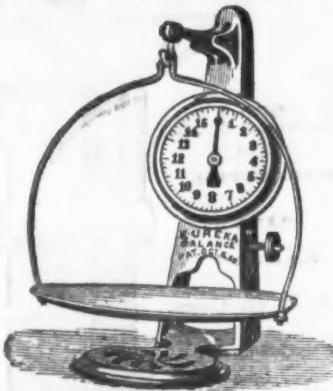
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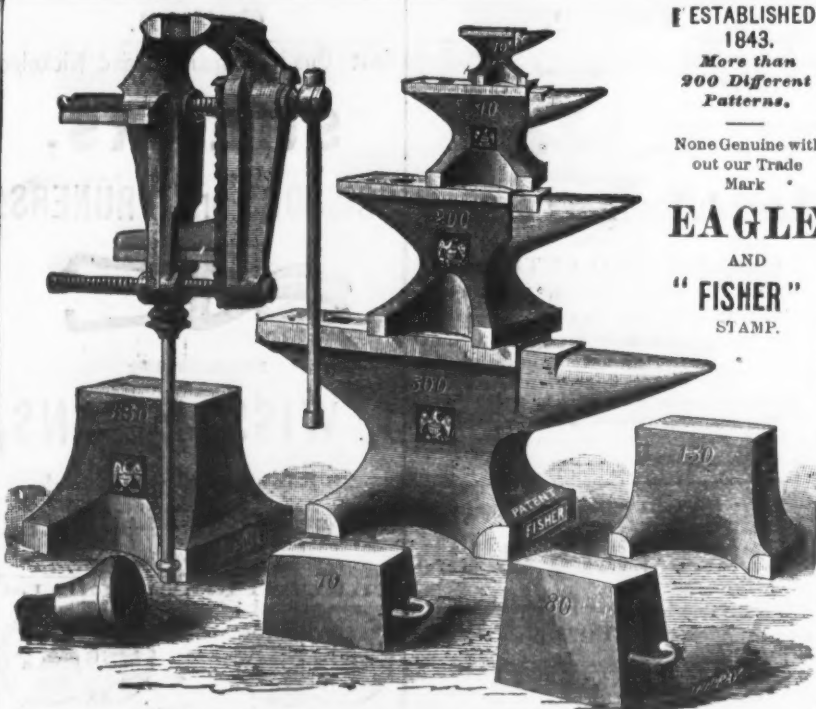
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### The Condition of the Building Business.

According to the custom of former years, says the editor of *Carpentry and Building* in the issue for June, we shall endeavor upon this occasion to give our readers some general particulars concerning the condition of the building business throughout the country at the present time, together with the prospects for the season. The country, as is very generally known, has enjoyed two years of marked prosperity in the building trades. Operations have been large during that time in almost every direction, and the number of men employed and the amount of building done in villages and farming sections has been almost as great proportionately, as in the cities. The indications are that the present year will be equally prosperous. While there is less activity in some of the great business centers than was the case last year, and the year before, the general average, taking the country from one extreme to the other, is quite as good as the present time as for the corresponding period in either of the seasons named. In one important respect the outlook at the present time is different from that of last year. Prospects in many sections of the country last spring were clouded by anticipated strikes and existing differences of opinion between employer and employed concerning wages. At present there seem to be no well-developed disputes of this kind, although clouds not larger than a man's hand appear above the horizon in one or two directions.

The information upon which we are basing our remarks, and upon which depend the facts and figures following, is derived from replies to circulars which we have sent to subscribers of *Carpentry and Building* in every town of 2000 inhabitants and upward throughout the country. From the mass of responses that we have received we have made tabulated statements for each State and Territory, so that as we write we have before us a map, as it were, showing in a graphic manner the opinions of our correspondents upon the points about which we have inquired. We asked the rate of wages per day for stonemasons, bricklayers, carpenters, painters and plasterers, with reference to what was paid last year, the rates current at present, and how they are likely to rule for the remainder of the season, in each of the trades named. With reference to employment, we inquired what proportion of the mechanics in the building trades in the several places were employed last year, what number are at present fully employed, and what proportion, in the opinion of our correspondents, will have steady employment throughout the season. We also inquired about new business, as to the character of the work upon which mechanics are at present engaged, the prospects of new work during the season, and how this outlook compares with that of a year since. Lastly, we asked what causes have led to the general condition of affairs that our correspondents report. The responses have come in voluminously, and, in addition to the formal answers to questions, many of our subscribers have written us letters giving many interesting particulars for which no provision was made in the blank report we sent them. In an article like this, necessarily restricted in its length, we can do but scanty justice to the vast array of facts and figures before us, much less acknowledge in detail the many pleasant letters which it has been our fortune to peruse in this connection on what are all-absorbing topics to our readers generally.

We will commence with the extreme eastern portion of the country and travel as rapidly over the several States and Territories as we can, and mention the most prominent facts reported by our correspondents. Throughout the 58 towns in Maine to which we addressed our circulars of inquiry, we learn that wages are much the same as they were last year; that mechanics are fully employed in all but two of the towns reported, and that the prospects of new work for the remainder of the season are fair in almost all the localities. Several towns report greater activity than last year. Much the same condition prevails in New Hampshire, although two out of the 25 towns in that State report that less work is in prospect for the present season than existed a year ago at this time. Of the 34 towns in Vermont less work is reported to be in prospect in Montpelier than a year ago, while in all other places from which we have reports about the same or even more work is anticipated for the remainder of the season than existed last year. Wages in both Vermont and New Hampshire remain the same as last year. Our report is very complete from the Old Bay State. Of the 150 towns in Massachusetts, all report wages as likely to rule the same as last year, with the exception of Haverhill and Hudson, in which a slight advance is considered probable. The rates in these two towns as at present reported are fully up to the average of the State. The rates named for Boston are \$3.25 to \$3.50 for stonemasons, \$3 to \$3.25 for bricklayers, \$2.50 for carpenters and painters, and \$3.25 for plasterers. Five towns only in that great commonwealth report less work in prospect at the present time than a year ago. These, it may be remarked, are comparatively unimportant places, all the rest indicating fully as much business in store as existed last season. Of the 21 towns in Rhode Island, most of them report about the same amount of business this year as a year

ago, while some say there will be more, and only a few less. Wages throughout the State rule about the same as a year ago, the large towns paying close up to the prices named for Boston above. Connecticut seems to be less favored than the other Eastern States to which we have referred. Out of the 60 towns, 10 report much less building in prospect now than a year ago, while a large number of our correspondents venture no opinion whatever. A few have said there would be more, while others content themselves by saying that there will be about the same. Mechanics in the building trades are at present fully employed. Wages rule about the same as a year since.

General activity and a continuance of the prosperity of the past two years characterize the 144 towns in New York State. Wages are reported higher in several places, while mechanics are fully employed in a majority of them. A very small number of unimportant places report less work in prospect now than a year ago, the vast majority of the towns anticipating a larger trade than last season. In New York City the building business is probably quite as active at the present time as for the corresponding period in either of the last two years. Not so much is being said about it at the present time as two years ago, because people generally, and the newspapers particularly, have become accustomed to the large operations which are proceeding in all directions. Wages are among the highest paid anywhere in the country, and rates are firmly maintained. Some of the large building projects which at the time of our report last year were temporarily suspended on account of labor difficulties have been resumed, and either have been completed or are being actively pushed at the present time. Other large operations are almost daily reported. While wages rule high in the great city, the increased cost of living and the lack of family comforts which the crowded condition of the metropolis causes gives the city workman quite as little to show for his labor as the man taking smaller wages in some of the interior towns. The prospects are good throughout the 54 towns of New Jersey, with the exception of Long Branch, which is conspicuous in reporting poor prospects.

In most parts of the Keystone State the building business is in a healthy condition. Our correspondent in Pittsburgh quotes stonemasons, \$3.25; bricklayers, \$4; carpenters, \$2.75; painters, \$3.25, and plasterers, \$3. He also says that an advance on these rates is probable. Very few towns throughout that State report less than the full number of mechanics employed, and only seven towns report less business in view than a year ago. Among these may be mentioned Titusville, in the oil region, in which the outlook is said to be poor. Our correspondent there reports about two-thirds of the mechanics as likely to have steady employment through the remainder of the season. Delaware is up to the general average. Nearly all her mechanics are employed; the general outlook is fair, and wages rule about as last year. The same may be said of the District of Columbia, although in Washington City more work is anticipated than was done in 1892.

The Southern States, taken together, present a less cheerful outlook than some of those to which we have just directed attention. Of the 15 towns in Maryland, none anticipate a change of wages during the season. The rates named are from 20 to 33 1/2 per cent. less than those ruling in the Central States. Nearly all her mechanics are employed, although less work in some of the towns is reported to keep all busy. In Virginia the same condition of affairs exists. With the exception of Richmond, Norfolk and Hampton, wages are quite as low as those last mentioned. A slight advance is anticipated in one or two of the towns in which rates at the present time are very low. Nearly all mechanics are at present employed, with fair prospects in most of the towns reported. North Carolina seems to be enjoying a fair degree of prosperity. Higher wages are anticipated in Wilmington, which are at present reported below the average of other points of similar importance. South Carolina anticipates more building than last year in each of the 12 towns to which we addressed inquiries, with the exception of one. Wages will rule about the same as last year, and at present a large majority of the mechanics are fully employed. Of the 20 towns in Georgia, all report wages as likely to rule throughout the season about as at present. The rates named by our correspondents throughout that State are somewhat higher than those in the other Southern States, although they average less than those paid throughout the Middle and Western States. Seven towns in Florida report a comfortable condition in the building trades. Mechanics are generally employed, and, with the exception of St. Augustine and Cedar Keys, wages are expected to remain about as last year. These two places are at present paying about the same figures. St. Augustine anticipates higher rates, while Cedar Keys expects to pay less. The outlook in Alabama is less cheerful than in the other Southern States. Our correspondents state, in many of the 16 towns to which we addressed inquiries, that trade is likely to be dull for several months to come. Wages in many cases are not established, but are arranged by negotiation when jobs are undertaken. The condition of affairs in Mississippi is a little more satisfactory. A lower tendency in wages is reported from Corinth, while other towns expect to pay about the same as last year. Mechanics at present are very generally employed. In Louisiana more work is anticipated in every town from which we have heard than was done last year. Wages in New Orleans are higher than in other towns in the State, and are nearly up to the general average paid in the larger cities. Our reports from 37 towns in Texas indicate that the Lone Star State is not being left behind in the race of material prosperity. General activity is reported in all directions, and an advance of wages is anticipated in both Austin and Dallas. Rates are relatively high throughout the State, and in general are expected to rule for the season about the same as at present. Arkansas would seem to be at a standstill. Hot Springs is the only town in which there appears to be an anticipation of an advance in rates. Our correspondent from that point does not seem to give a good reason for his expectations in



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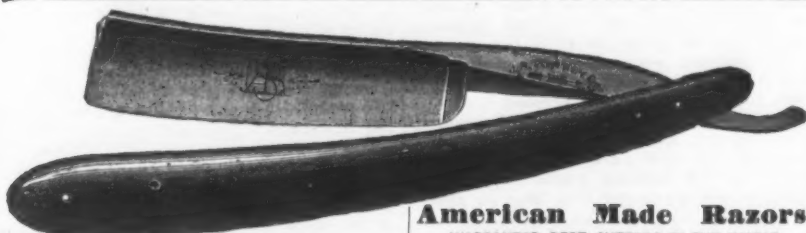
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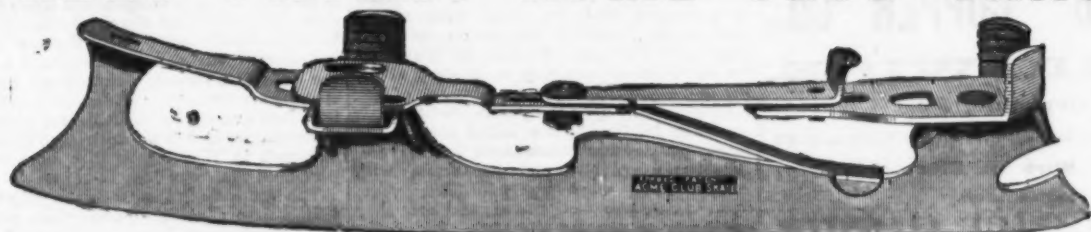
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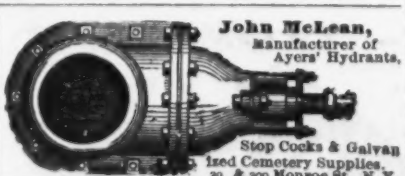
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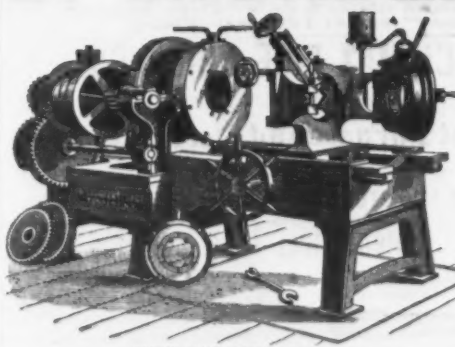
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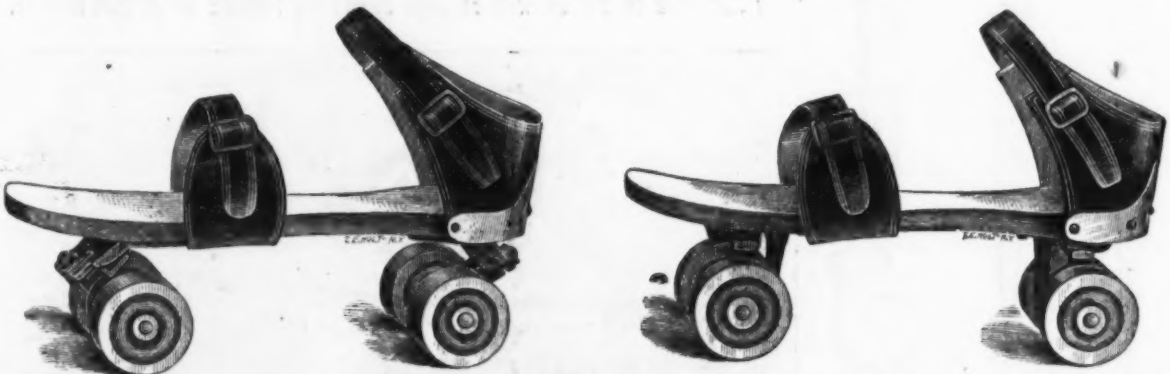
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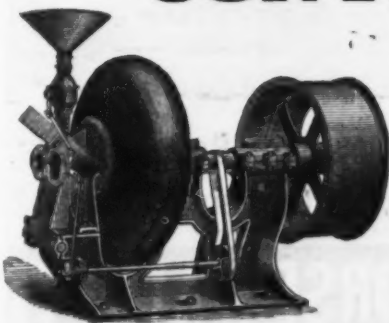
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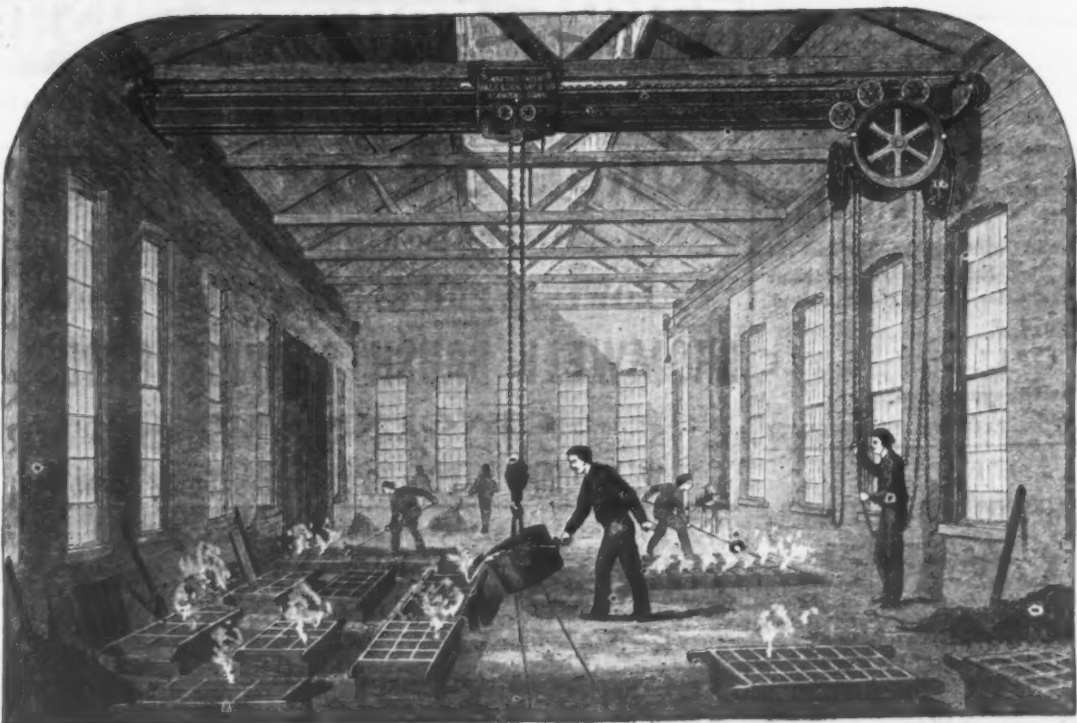
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Circulars on application. Full specification and tender submitted on receipt of capacity and span of bridge desired.

this direction, as he reports many men idle at the present time. Fine Bluff anticipates a larger business than was done last year.

In the great Central Western States the mechanics in the building trades seem to have a fair prospect for full employment throughout the season, with wages about the same as ruled at the close of last year. Of the 105 towns in Ohio, five report an upward tendency in rates, while only one indicates a dropping off. Our correspondents unite in the opinion that nearly all the mechanics in the building trades will have employment throughout the season. Rates in Cincinnati are considerably above the average for the State, being \$4 for stonemasons, \$5 for bricklayers, \$2.75 for carpenters, \$2.50 for painters and \$4 for plasterers. The general average throughout the State for carpenters is from \$2.25 to \$2.75 per day. Among the 61 towns in Indiana the same general conditions prevail. Rates in Indianapolis are about equal to the general average of the State. Several towns report a probability of higher wages before the season is over, although the rates named as ruling at the present time are fully up to those of the section of which Indiana is a part. Mechanics are very generally employed throughout the State at the present time, and prospects of work for the remainder of the season are good. Among the 101 towns in Illinois to which we applied for information, the conditions are very much the same as those just reported for Indiana and Ohio. Mechanics at present are very generally employed. Wages rule firm, with an upward tendency in a few cases, and the prospects for work are very good. Building operations in Chicago have been embarrassed by a strike. Mechanics from the surrounding country, however, have gone to that city in such numbers that the difficulty is about removed.

Among the towns of West Virginia it would seem, from the reports we have received, that mechanics are generally employed. Wages rule up to the average, and there is plenty of work in prospect. Of the 27 towns in Kentucky it is reported that the same rates are likely to prevail for the balance of the season as are now paid. Mechanics are fully employed, and there is an abundance of work in prospect. In Tennessee the same conditions exist. Memphis is paying higher rates than the smaller towns, and anticipates continuing wages at about the present standard throughout the season. In most of the places in that State from which we have heard the prospects for a continuous business throughout the season are good.

The building trades are prosperous in the Peninsular State. Of the 74 town in Michigan very few report less work in prospect than was done last year. A few anticipate a slight advance in wages, and all of them report mechanics well employed at the present time. The building trades in Wisconsin are fairly active, with good prospects for the season. Milwaukee pays lower rates than some of the smaller places, and reports about 90 per cent. of her mechanics fully employed. Most of the towns anticipate fully as much trade this year as last. The same general conditions prevail in Iowa. Rates in some parts of that State rule higher than in those immediately east and south of it. Slight advances are anticipated in some directions. Nearly all mechanics are employed at the present time, and prospects generally are promising. Rates in the 40 towns in Missouri to which we addressed circulars are somewhat higher in their general average than those ruling in the Central Western States. St. Louis, on the other hand, reports lower figures than some of the smaller towns in the State. The rates named for that city are as follows: Stonemasons, \$3.50; bricklayers, \$3.25; carpenters, \$2.75; painters, \$2.50, and plasterers, \$3.50. Our correspondent reports nearly all at present employed, and thinks rates will rule the same during the balance of the season.

Of the 21 towns in Minnesota very few report less work in prospect than was done last year. The majority of them anticipate an increase of business. Wages rule about the same as the general average of the section of which Minnesota is a part, and are likely to remain the same during the season. From Kansas our reports are somewhat conflicting. Some of the towns anticipate a larger business, while others will do less. Wages will probably remain at about present rates, which are perhaps 10 per cent. under those of neighboring States. Mechanics at present are very generally employed. In Nebraska the outlook is not the most favorable. While mechanics are fully employed, less work is reported in prospect from more than half of the towns from which we have heard than was done last year.

In the Territories occupying the central belt west of the Mississippi, wages, of course, rule at rates far above those paid in other communities. Ogden City, Utah, for example, reports stonemasons, \$4; bricklayers, \$4; carpenters, \$3.50; painters, \$2.75; plasterers, \$3.50, with an upward tendency. Mechanics throughout that Territory seem to be fully employed at the present time, and, with the exception of Salt Lake City, all the towns from which we have heard report more work in prospect than a year ago. In Montana Territory wages are nearly 50 per cent. higher than those last quoted. Our correspondents, however, anticipate lower rates for the future. Mechanics are not very fully employed at the present time, and less work is in prospect than last year. In New Mexico about the same rates prevail, and trade is probably a little better than in the Territory last mentioned, although our correspondents are not very sanguine. In Dakota rates are not quite so high, and trade is reported better. In the State of Colorado rates are somewhat less than those ruling in the Territories, although very considerably above those of some of the other States. One town out of the 16 in that State anticipates higher rates, while 4 report less work in prospect than was done a year ago. At present about three-fourths of the mechanics are fully employed.

Our replies from the States on the Pacific coast are unusually complete. Wages in California rule from 25 to 33 1/2 per cent. higher than the general average throughout Ohio, Indiana and Illinois. Our correspondents anticipate that nearly all mechanics in the building trades will have steady employment

through the season. Of the 30 towns containing 2000 inhabitants and upward in that State, two report less work in anticipation than was finished last year. The others, for the most part, anticipate a larger trade.

The rates paid at Portland, Oregon, are reported as follows: Stonemasons, from \$5 to \$7; bricklayers, from \$5 to \$5.50; carpenters, \$3.50 to \$4; painters, \$3, and plasterers, \$4.50. Our correspondent anticipates even higher rates than these before the season is over. A large trade is in prospect, and every mechanic is at present employed.

Our readers will perceive that this report of the building trades at the present time is somewhat monotonous in its terms. Mechanics are very generally employed at wages that are presumably satisfactory to both employer and employee. The character of the improvements being made varies from repairs of old buildings and erection of new ones of moderate cost to elaborate structures for both private and public purposes. The building trades are at present perhaps more quiet in all respects than they have been before in several years past. Less talking is being done, less public notice is being directed to them and more solid work is being performed than in past seasons. Such a condition of affairs cannot be otherwise than healthy, and the building trades generally are to be congratulated that they exist. There are no special lessons to be derived from the situation as we have presented it. There are one or two facts, however, to which we may direct attention profitably. Of the five trades reported, painters, at the present time, are the poorest paid. Next in order come the carpenters, with rates scarcely any higher than those which the former receive. Following the carpenters come the plasterers, in many cases receiving about the same wages, although they average from 25 to 50 cents per day above them. Next in order are stone masons, there being a material advance between plasterers and this class. Highest in the list come the bricklayers, with wages averaging 50 per cent., in many cases, above those paid carpenters. These facts cannot fail to be of importance to those who have boys whom they anticipate apprenticing in the building trades. As wages rule at present, the bricklayer is king of them all. He has the most independent position about a building and receives the best wages.

**The Coke Trade.**—"The position of the coke trade," says the Pittsburgh Dispatch, "affords another striking instance of reaction from excessively rapid development. Under the large profits of that business, which followed the recovery of the manufacturing interests from the depression of 1878, the enlargement of the coke trade was the most remarkable feature of the expansion of business. Before the growth of the business was stimulated in 1878, the total number of ovens in the Connellsville region was about 3500. In five years the total has grown to over 10,000. Immense sums have been invested in coal lands, and great fortunes made by those who bought them in the era of low prices. The reaction from over-production has come. Prices have declined, until now, under the combined influence of heavy supply and restricted demand, they are as low as in 1877, while the elements of cost, represented by wages and capitalization, are much larger. It therefore becomes imperative for the trade to do something in the way of lessening cost and amount of production. The manufacturing interests of Pittsburgh need not object to the prospect of cheap coke. With other elements of cost in proportion to the present price of coke, Pittsburgh can manufacture iron almost as cheaply as Sheffield, and probably the cheapening of our great manufacturing staple affords the surest method of reviving the sluggish consumption. But it is to be hoped that the coke trade may be regulated so as to place it upon a basis of moderate profits, and that the striking lesson it affords of the impolicy of excessive expansion may not be lost upon business men at large."

**Extension of Spanish American Trade.**—A desire to extend the commercial relations between Spain and the Spanish Republics of Central and South America has frequently found expression of late in the Spanish press. The subject is referred to in the last number of the *Eco de las Aduanas*, which gives the following statement of trade with some of those countries. The year chosen, 1880, is presumably the latest period for which reliable statistics are obtainable:

	Spanish Imports.	Spanish Exports.
Costa Rica.....	258	241
Chili.....	8,668	798
Guatemala.....	235	2,002
Honduras.....	.....	1,678
San Rafael.....	.....	4
San Domingo.....	2,844	914
San Salvador.....	.....	14
Danish Possessions.....	9,706	84,704
French Possessions.....	20,708	54,693
Dutch Possessions.....	126,379	7,131
English Possessions.....	.....	67,742

"These figures," the editor thinks, "speak eloquently of the pressing need for developing Spanish commerce with the Spanish-speaking countries of the New World," and the conclusion of treaties of commerce with those countries is warmly advocated.

In the last five or six years railway men appear to have entirely lost sight of the question of dead weight, and from the way in which the weight of rolling stock has been increased, it would appear that dead weight has come to be considered of no possible consequence. This is a mistake, and a very grave one. Necessity forces car builders to produce stronger and heavier cars, yet this should not be made an excuse for carelessness in regard to the weight of material going into car construction. Because it becomes necessary to increase the weight of a passenger or freight car by one-half, there is no valid reason for allowing useless weight to go into it and still further add to the total. Castings ought to be pared down and relieved of every ounce of superfluous weight just as carefully on a car that weighs 80,000 pounds as on one that weighs only 35,000. Blocking and furring ought to be kept down to the smallest dimensions that will answer just as carefully as in a lighter car, and there should be no extravagance of material.



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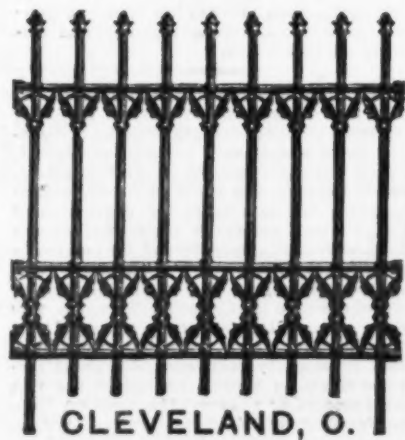
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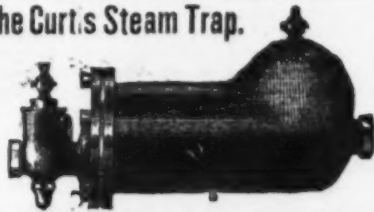
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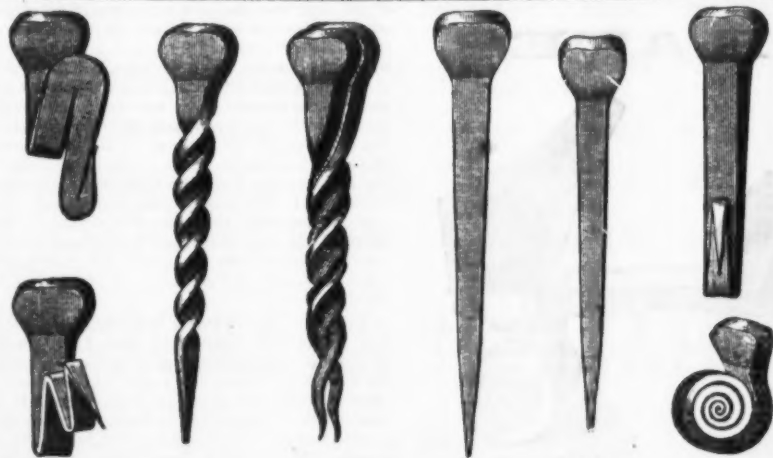


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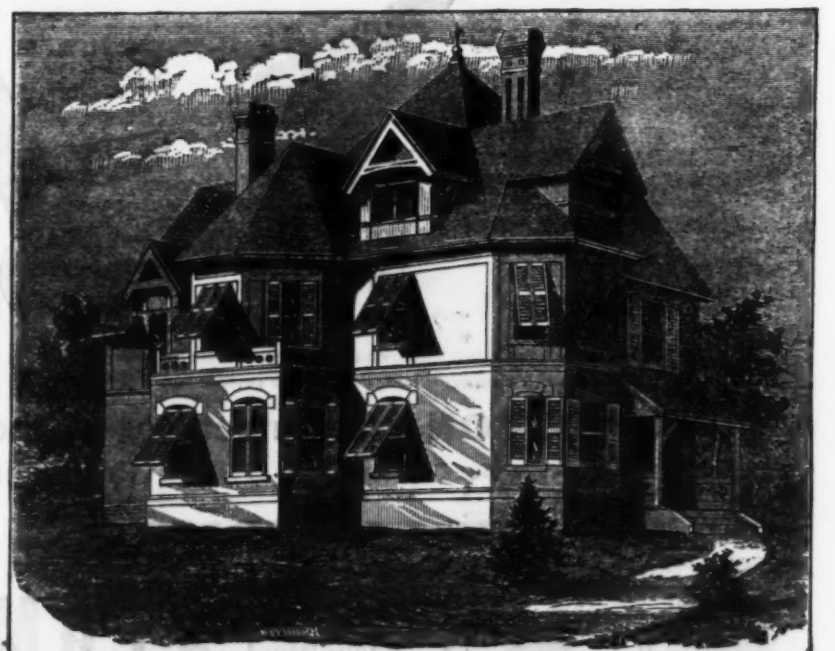
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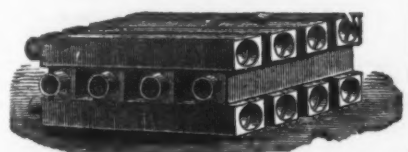
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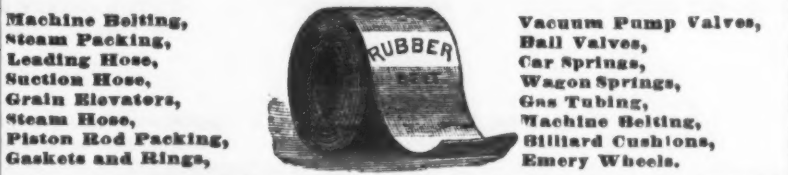
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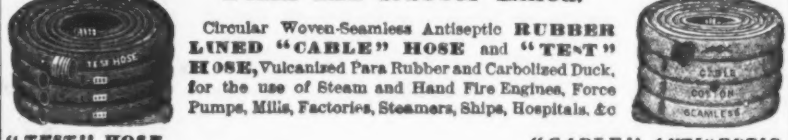
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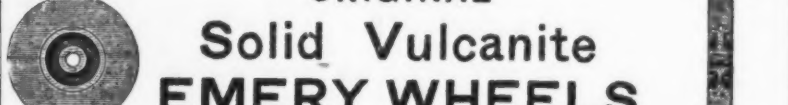
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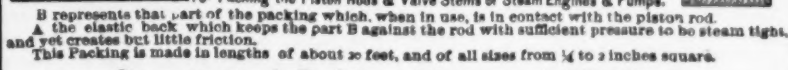
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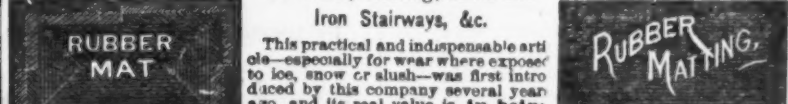
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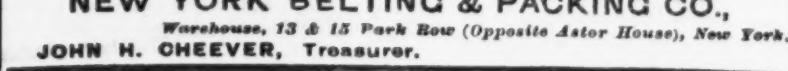
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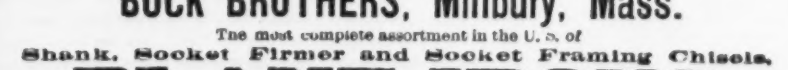
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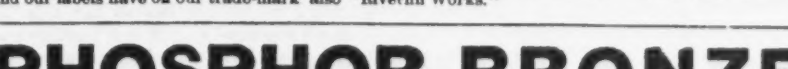
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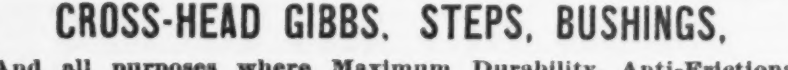


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at any point except in members that, like the  
sills, actually go to maintain the strength of  
the structure. It used to be said in old times  
that a carriage maker ought to serve a sort  
of half-apprenticeship to a ship carpenter, in  
order to know how to build his work strong,  
and in these days it would seem that every  
master car builder ought to serve an appren-  
ticeship with a carriage maker, in order to  
make things light as well as strong.

**WASHINGTON LETTER.**  
(From Our Own Correspondent.)  
WASHINGTON, D. C., June 13, 1883.

Assistant Secretary French, who is spe-  
cially in charge of the arrangements neces-  
sary to the execution of the new tariff law,  
has the machinery so well organized that no  
serious inconvenience is anticipated on July 1.  
The officials here were at first apprehen-  
sive that a vast amount of embarrassment  
would grow out of the litigation which  
seemed almost inevitable between the im-  
porters and the Government. In relation to  
the transition from the old law to the new,  
the law says "that all imported goods, wares  
and merchandise which may be in the pub-  
lic stores or bonded warehouses on the day  
and year when this act shall go into effect  
shall be subjected to no other duty upon the  
entry thereof than if the same were im-  
ported respectively after that day." The  
question was raised as to the application to  
cargoes at ports of entry and in transit from  
the vessel to the bonded warehouse—whether  
the duty should be rated under the old or the  
new law, or whether the rate should be  
divided according to the condition of the  
cargo at the hour of noon on July 1. In  
order to meet this emergency, the depart-  
ment has ruled "that all goods entered prior  
to July 1, whether they have reached the  
bonded warehouse or not, will be regarded  
as though they actually were in the public  
stores or bonded warehouses on that day." The  
duty therefore chargeable upon goods  
entered before July 1 will be under the new  
law, if in transit, as stated. The department  
is advised that some parties will object to  
this ruling where their interests are affected,  
but generally the decision is approved as the  
simplest way out of a perplexing situation.  
The old notion of the constitutionality of the  
law is also being agitated, and this question  
may come up in some of the litigation which  
must spring up under any circumstances.

## THE TARIFF IN POLITICS.

The letters of Senator Bayard, of Dela-  
ware, and ex-Senator McDonald, of Indiana,  
on the tariff are creating considerable com-  
ment here in political circles. The first im-  
pulse upon perusing the disquisitions of these  
erudite leaders of the Democratic party is  
that of novelty, if not of amusement. The  
ambidextrous handling of that perplexing  
problem, the tariff, is quite noticeable. Sen-  
ator Bayard, who is unquestionably the ablest  
man in the Democratic camp, is perhaps the  
least imprudent with the poison of ultra free  
trade. McDonald has the notion of the same  
subject so vehemently maintained by the  
Hoosier Democracy, and which was so em-  
phatically overruled by the vote of the peo-  
ple in the campaign of 1880. It is now time  
for that "frail Senatorial Scot, Beck, of  
Kentucky, to fire off his long-promised screed  
in reply to the protection views of Senators  
Sherman and Morrill. No doubt is enter-  
tained by the Democratic leaders who drop  
in here that free trade will be the distinctive  
issue of their party in the next campaign.  
This will account for the haste and volubility  
shown by the would-be Democratic nomi-  
nees for the Presidency in defining their  
positions on this subject. The antagonism  
of positions as between the conservative or  
do-nothing-at-present policy of ex-Speaker  
Randall and that wing, and the ultra tariff-  
for-revenue represented by Carlisle, and, in  
fact, the mass of the party, is irrepressible,  
and one or the other will be driven to the  
wall before the question can be dis-  
posed of and submission and harmony se-  
cured. The intelligent minority of the party  
claim to advocate a sort of Jack-  
sonian so-called constitutional tariff, which  
is claimed as judicious. This is recom-  
mended to the party as the theory now  
represented by Messrs. Bayard and Randall.  
More of the aspirants for Presidential  
honors will be heard from before the nomi-  
nations about twelve months hence. The  
gist of the whole thing hangs on the as-  
sumed doctrine that the Constitution is not  
authority for any other tariff than one for  
revenue only. Judging from present indi-  
cations, the people will have a constitutional  
as well as an economic question to dispose  
of in the campaign of 1884. In the mean-  
time the tariff will be very thoroughly ven-  
tilated.

## THE SCOTCH IRON TRADE.

Among the reports received at the Depart-  
ment of State is a review of the Scotch iron  
trade, which indicates unusual activity for  
the past year. It appears that from the end  
of 1874 to the beginning of 1882 the stock of  
pig iron in Scotland increased from 95,000  
to 940,000 tons, an amount nearly equal to  
the demand of the home and foreign markets  
for twelve months. Relying for relief upon  
a restricted production of about 12 1/2 per  
cent, and an expectation of increase of  
business growing out of "the development of  
trade and of railway and other enterprises  
in the United States," the effect of these  
influences soon began to be felt. It is re-  
ported that the stock was reduced 104,000  
tons during 1882. It was expected at the  
beginning of the present year that the  
demand would overtake the supply. The  
prices for Scotch pig iron are reported as  
ranging between \$12.68 in July and \$11.74  
in December. The product for nine  
months in 1882 was 1,126,000 tons from  
an average of 108 furnaces, or about 200  
tons per furnace a week. The amount  
for 1881 was 1,176,000 tons from 116 fur-  
naces. The consumption of pig iron in Scot-  
land in 1882 aggregated 930,000 tons, of  
which 585,000 tons were Scotch and 345,000  
English. The shipments during the same  
year amounted to 645,000 tons, of which  
145,518 tons were sent to the United States.  
This was an increase of 39,747 tons in  
American shipments in 1881, but a decrease  
of 87,825 tons as compared with the year  
1880. The product of malleable iron in 1882

was 474,000 tons, an increase of 113,000 tons.  
It is claimed that the exports of this iron  
have not increased proportionately. The  
amount exported to the United States was  
3900 tons. As showing the downward tend-  
ency of prices, the report states that they  
were low, and profits were decidedly less  
than they were a few years ago, but cheap  
labor and further reductions in the cost of  
raw material brought the cost of production  
down to a minimum point.

## FREE TRADERS ORGANIZING.

The national conference of advocates of  
free trade, held at Detroit about 10 days  
ago, is looked upon here as a very significant  
note of warning to the friends of American  
industry and labor. The proceedings indi-  
cated not only a spirit antagonistic to  
protective legislation, but insisted upon  
corrective action of the friends of free  
trade in the Forty-eighth Congress. The  
best evidence of the determined purpose of  
this movement is shown by the character  
of the men who were elected to the offices  
of the concern. David A. Wells, of Con-  
necticut, was chosen president, and at the  
head of the vice-presidents is W. H. Spencer,  
of Illinois, Democratic aspirant for Speaker  
of the next House of Representatives. Among  
the other vice-presidents is Frank H.  
Hurd, of Ohio, Representative in the next  
Congress, and the man who rejoiced that he  
was elected for the opportunity it gave him  
to knife the iron industries. Charles Francis  
Adams appears also as a shining light in  
this galaxy. William H. Smith, of Iowa,  
who fires the Granger heart, and eight or  
ten greater or lesser lights, adorn this  
platoon of agitators. The significance of  
these early efforts of the free traders is  
looked upon here as of sufficient importance  
to merit the attention of manufacturers and  
workmen, with a view to counter organisa-  
tion and efficient work.

## A New Time System.

New Haven, we are informed, now has a  
new time system which is giving most satis-  
factory results. Various attempts have been  
made abroad and in this country to arrange  
systems of clocks to keep uniform time, but  
most of these system have been a series of  
electrical clocks or electric dials which have  
been driven by an electric current, making  
a jump every second. All these systems,  
which work nicely in a room, and with a fair  
degree of success when the clocks are dis-  
tributed in different portions of one building,  
have been found, when applied to outdoor  
wires, subject to the varying outdoor con-  
ditions, practical failures. The principal dif-  
ficulty has been that a single break would  
throw one or more clocks radically out of  
time. Another system, developed to a con-  
siderable extent in Paris, is known as the  
pneumatic system. This, although much  
less liable to interruption than that of elec-  
tricity, is such that any interruption causes  
the clocks to stop. Hitherto all systems have  
run from a clock at one station. The system  
which the Standard Time Co. have now intro-  
duced at New Haven has worked very suc-  
cessfully for years in London. The clocks  
used are good time-pieces, with the motive  
power furnished by springs or weights. They  
run independently of the electric cur-  
rent. The office of the current is to give  
once an hour, or less frequently if desired, a  
signal, which sets every clock at the same  
time. The signals are always sent out at the  
even hours, and the clocks are set by bring-  
ing the minute hands to the XII point. The  
New Haven system, just open, and having  
some 15 or 20 clocks in circuit, has the  
advantage over any system ever before  
attempted in this country of having the most  
accurate observatory time. The signals are  
not given simply from a good clock kept as  
nearly right as possible, but are accurately  
given from an astronomical clock at the Yale  
Observatory, the monthly variation of which  
is but a fraction of a second. As the system  
is now arranged, two or three different pat-  
terns of clocks are furnished with synchro-  
nizers attached—a clock to be bought and be-  
come the property of the purchaser, who has  
nothing further to do in the matter. The  
clock is hung on the wall, and for a yearly  
rental the clock is wound and kept right,  
and it is attended to, when needing repairs,  
at the lowest rates. Whoever has one of  
these clocks will receive signals twenty-four  
times a day, 365 days in the year. The sig-  
nals are sent over covered wires, thus re-  
moving all danger of crossing which will  
occur with the best system of uncovered  
wires. The time given is the time of the  
State, coming from the clock which gives  
signals to all the railroads, under the statu-  
tes of the State; it is the time recognized  
as official time, if such a thing can be said  
to exist. A noteworthy fact is that New  
Haven is the first town on this side of the At-  
lantic—and, in fact, the only town in the  
world except London—to possess this facility.  
New York depends on time-balls and unre-  
liable electric dials. Boston is in the same  
condition. Chicago has no reliable time,  
and people there are governed, according to  
business, by one of half a dozen standards.  
New Orleans is in the same condition, and  
Philadelphia is not situated much better.

**Arago's Little Joke.**—One day at the  
Academy of Sciences they had a long and  
tiresome session. Arago thought he would  
go out and take the air. At the foot of the  
stairway there was a leather bowl, upon  
which the rays of the sun were hotly beat-  
ing. Arago turned the bowl round, and,  
rushing up stairs, told the distinguished  
assemblage that he had just met with some-  
thing that was very mysterious. "That  
leather bowl," he said, "at the foot of the  
stairway is cool upon the side which pre-  
sents itself to the sun, but warm upon the  
other side." The scientists descended in a  
body and substantiated this assertion. They  
took the inclination of the sun, the hour, the  
minute, the seconds and a vast array of  
other details. They made calculations, and  
several weeks afterward each of them pre-  
sented a paper explaining the phenomenon.  
Arago himself taking care to send in his  
explanation with the rest. There is no know-  
ing how far the discussion might have gone  
had it not been for the doorkeeper who,  
having seen Arago turn the bowl, and find-  
ing the worthy gentlemen who were so much  
worried, cleared away the mystery.







has been in a large measure arrested. That great national work, the Canadian Pacific Railway, is also in much better condition, owing to the recent successful placing of bonds, and from this date will make much more vigorous progress toward spanning the continent. The rails are already laid 600 miles west of Winnipeg.

While it is possible the Montreal bankers, who disclaim being either "croakers" or "alarmists," may have drawn their picture in too somber colors, their evident design is to check the tendency toward dangerous expansion within the territories of British America, and their admonition must prove salutary, irrespective of the increased immigration and revival of business, which, according to the latest mail accounts, "bids fair to be as profitable as that of last year." Within certain limits, the suggestions ventured are applicable to this side of the St. Lawrence boundary.

#### Steamship Dimensions.

The accident to the steamer City of Rome, which ran aground near Sandy Hook last Saturday when leaving this port, has revived the controversy among engineers and navigators respecting the extreme limit in the dimensions and draft of sea-going steamers. A number of our foremost commanders have recently expressed their views on this subject, and seem to be almost unanimous in the belief that, in the future, steamers larger than the City of Rome will seldom be built. Captain Hawley, the commander of this vessel, says that at the time she grounded, her mean draft was 26½ feet, but she will draw 30 feet of water when loaded to the Plimsoll line. It is well known that among the owners and managers of the Cunard line serious differences have recently sprung up respecting the proper dimensions for steamers in the Atlantic trade, some leading minds claiming that the company in their policy are too conservative, thus enabling their rivals to gain an undue advantage. Captain Currier, representing this company in a recent interview, said that the old rule for making steamships was to build them eight times the length of their breadth, but this method had been departed from. The City of Rome is twelve times as long as she is wide. He thought the limit of large steamships had been reached. The new Aurania, which the Cunard Company are building, is to be in length only a little more than eight times her breadth. What is lost in depth is said to be gained in breadth in ships like this.

Among the various opinions elicited were those of Captain Badenhausen, of the Hamburg line, who thinks that when a ship is 500 feet long she is long enough, and that hereafter this will be the limit. He said it was impossible to steer a large vessel well with only 2 or 3 feet of water under her keel. Captains Benyon and Jackson, of the Red Star line, entertain similar views, contending that moderate-sized ships will pay best in the long run. The superintendent of the White Star line says that these extra large craft are not desirable, because of the difficulty of using them with economy. Steamers of the other lines—the State line, the French line, and the Rotterdam line—never load beyond a draft of 24 to 26 feet, and have no difficulty in the depth of water. It is evident that the draft of ocean steamers has nearly reached the extreme limit, at least as regards the capacity of nearly all our principal seaports; for it is absurd to conclude that steamship lines will change their terminus from New York to Portland, or any other point where harbors have a deeper channel, so long as the old routes possess other advantages of paramount importance, such as celerity in transporting passengers and facilities for distributing goods in the interior and securing return cargoes. Moreover, the limit as to economy in fuel and other expenses of navigation has been tested in all conceivable conditions, and the liability to disastrous collisions or running aground are factors inseparable from the general problem which culminates in the superlative question of net profits. A mathematical demonstration touching all the intricate points involved being hardly possible, it is at least satisfactory to know that the rage for big ocean steamers has experienced a check. So far as passengers are concerned, it is fair to presume that they will select smaller vessels when they understand thoroughly that larger vessels, on account of their depth, may get stuck on a sand bank in the harbor and cause vexatious delays, with an element of danger under certain conditions.

Only one month remains of the current fiscal year. An official statement of the Government's receipts and expenditures for the 11 months that have passed is almost as useful as a basis for comparisons as the annual statement that will be prepared 30 days hence. This statement shows that our receipts have fallen off and our expenses have increased, notwithstanding a large reduction of interest charges. The decrease in receipts for the 11 months, as compared with the receipts for the corresponding period of the previous year, is about \$7,000,000, caused by a loss of customs revenue amounting to \$10,000,000, part of which is offset by gains in the internal revenue and miscellaneous divisions. The expenditures have already exceeded \$250,000,000, and are greater by \$8,000,000 than the expenses of the same period in the previous year, although the interest payments have fallen from \$68,000,000 to \$56,000,000 for the 11 months. The ordinary expenses have been greater, however, by \$12,000,000, and the pension payments have been greater by \$8,000,000. The payments on account of pensions in the first eight months of the year were only \$35,000,

000, but in the three months of March, April and May they amounted to \$30,000,000, the payments in the month just ended having been nearly \$12,250,000. The year's receipts will probably fall \$2,000,000 or \$3,000,000 below the round sum of \$400,000,000, and the year's expenses will be something less than \$275,000,000.

#### Limitations of Speculation on the New York Metal Exchange.

We have the following letter from Mr. E. J. Shriver, secretary of the New York Metal Exchange. Concerning the same, we think it only fair to say that Mr. Shriver's point is well taken, and it is probable that the scope of his official admissions respecting the meaning of the vote of June 4 was unintentionally enlarged by us, as the result of conversations with other gentlemen somewhat less guarded in their comments. However, we do not think that Mr. Shriver expressed himself in conversation quite as specifically as he now does in writing; but if his letter conveys his meaning better than his words did, it is a great pleasure to afford him space for its publication:

NEW YORK METAL EXCHANGE,  
BURLING SLIP AND PEARL STREET,  
NEW YORK, June 9, 1883.

To the Editor of The Iron Age.—DEAR SIR: Allow me to make a correction of one portion of the editorial on the "Metal Exchange Election," in your issue of the 7th inst.—that referring to my interpretation of the meaning of the vote—where you make a mistake that was doubtless owing to an imperfect recollection of our conversation. What I did say was that the issue having been clearly drawn by Mr. Cook and Mr. White at the meeting before the polls were opened, the result pledged the exchange to the principle of maintaining a daily call, and of throwing safeguards around so-called "legitimate," as well as "speculative," transactions by a system of margins, which system will unquestionably increase the speculation that has always characterized so largely the metal trades, while in a measure changing its character, but, as the experience of other exchanges has shown, greatly for the better. There was no mention between us of "puts," "calls" or "straddles," which are forms of contract entirely distinct from such a system, and are not, indeed, protected by margins at all. As a journalist, you surely must know that these "privileges" are not recognized on any of the exchanges where speculation, pure and simple, is a main feature, while the rules of the New York Stock Exchange absolutely prohibit dealings in them on the floor, the "put and call" brokers usually not being members of the exchange.

I trust that in justice to the Metal Exchange, as well as myself, you will give this correction the same prominence as your own statement of my remarks.

Very truly yours,  
EDWARD J. SHRIVER.

**Novel Means of Propelling a Screw Steamer.**—The Scotch iron steamship Ardair, of Glasgow, arrived at Philadelphia from Fernandina, Fla., under rather peculiar circumstances and with unique powers of propulsion. The Ardair is a large freight steamer, brigantine rigged and was on her maiden trip. Her cargo was a "picked-up" one, consisting chiefly of cotton seed, consigned to order of importers in Cork, Ireland, and Falmouth, England. After leaving Fernandina, the Ardairigh steamed toward her destination, but when but 150 miles on her course her propeller blades broke, rendering her motive power useless. All sail was ordered out, but, there being little or no wind, no headway was made. The captain, a Scotchman, served at one time as mate on a Yankee vessel, and it may have been there that he acquired his inventive powers, for his necessity gave birth to another invention by which the Ardairigh was transformed into a sidewheel steamship. The captain says that by drilling holes in her iron walls, just above her forward deck, he made openings for a wooden shaft constructed of hoisting spars; at either end paddles of heavy plank were fastened. The donkey engine and winch were brought into play, and by the use of bands and cog-wheels fastened to the machinery the shaft was revolved, the paddles whirled around and the great ship was forced forward at the rate of a knot and a half an hour. In this way she passed Hatteras and reached Hampton Roads, Va., where she anchored for a few days, and on May 23 again started on her journey and reached the Breakwater on May 30 and was towed up the river.

**Metal Exchange Committee.**—At a meeting of the Board of Managers of the New York Metal Exchange, held last Thursday, the following committees were appointed: Executive, Theo. Sturges, B. F. Judson, H. B. Moore. Finance, John C. Cook, Joshua Hendricks, J. T. De Blois. Law, E. P. White, A. G. A. Harnickell, Theo. Sturges. Floor, E. J. Shriver, W. P. Tilton, D. Houston. Warehouse, Elliott F. Driggs, E. S. Wheeler, J. F. Pierson, T. D. Hazard, L. Hershheim. Trade, J. P. Williams, Carl Mayer, Wm. Houston, H. J. Egleston, H. J. Lamarche. Complaint, John C. Cook, F. Dickerson, Joshua Hendricks. The board ordered a meeting of the Exchange to be called for June 15 to name a price for the admission of new members. The present membership is 260, and it was proposed to charge \$150 initiation fee for 40 more, and \$250 for the next 100; but the weight of opinion among the managers was in favor of admitting a limited number from the metal trade exclusively at \$100 each.

At the annual meeting of the Colorado Coal and Iron Co. the following were elected directors for the ensuing year: William J. Palmer, C. F. Woerishoffer, W. H. Hays, August Rüthen, John Scott, Henry Amy, D. C. Dodge, R. H. Lamborn, and H. H. Danford. The annual report shows: Gross earnings, \$4,175,313; operating expenses, \$3,905,736, and net earnings, \$509,577. The interest charges were \$163,403, and premiums, discounts, bankers' commissions, and sundry old accounts charged to profit and loss, \$138,112—a total of \$301,515, leaving a net surplus of \$208,062.

### THE AMERICAN INSTITUTE OF MINING ENGINEERS.

#### MEETING AT ROANOKE, VIRGINIA.

The announcement made by the secretary of the Institute some time since that the summer meeting would be held at Roanoke, Va., undoubtedly met with almost universal approval, and for weeks past the event was looked forward to with the keenest interest and the most pleasant anticipations. To the credit of the various committees, be it said, the expectations of the numerous attending members and ladies were fully realized, and the Roanoke meeting will long be a source of pleasant recollections. It was but natural to expect that the picturesque beauty of the place, the many points of interest in the vicinity, and the excellently-arranged programme, would attract a large number of visitors, and estimates as to the attendance based on these circumstances did not fall wide of the mark. In fact, even the first session of the Institute, held at the Roanoke Hotel on the evening of June 4, was well attended, and many other members were still expected. Addresses of welcome were made by Mr. J. B. Austin, chairman of the Citizens' Committee, Mr. Lucien H. Cooke, Mayor of Roanoke, and Maj. S. Griffin, which were ably responded to by President R. W. Hunt, who then delivered the following inaugural address:

#### PRESIDENT HUNT'S ADDRESS.

Upon assuming the duties of the high position to which you have elected me, I beg to thank you most sincerely for the honor conferred. To be the presiding officer of your society is a gratifying distinction, but entering upon that office as the successor of the able gentlemen who have preceded me renders me diffident as to the results of the ensuing term. But believing your hearts, rather than your cooler judgments, were consulted in making your selection, I, in self-defense, now rely upon them for forbearing criticisms where weak, and warm support where strong and right. Connected as most of us are with the active industries of the country, we are called upon to encounter, not only engineering problems, but commercial ones as well. In fact, the two are so intimately associated that the success of one is the triumph of both, for while engineering difficulties may be overcome, if the result is not a commercial success the world refuses to grant praise, and certainly withholds substantial rewards. I presume never since the organization of this Institute has the metallurgical engineer been called upon to meet a more embarrassing condition of affairs than at the present time. We have been through panics, through periods of depression and times of inflation, but just now, owing to the legislative status, an entirely new element enters into the problem.

After the warm words of graceful welcome to which we have just listened, with the certainty of having displayed to us, during the next few days of our visit to their storehouse of nature's treasures, such boundless mineral and agricultural wealth, made available by intelligent enterprise and industry, it is next to impossible to realize the existence of aught but untrammelled prosperity. Eight years ago the President of this Institute, in his address at the Cleveland meeting, presented, as he so well could, and in his clearest, most forcible manner, the necessity for a general adoption of better methods, more economical machinery and saving appliances in all branches of manufacture. His warning words were uttered at a time when the business outlook was much the same as now. During the years which have elapsed since then many steps have been taken in the right direction. But a period of great prosperity—at least of great activity—came upon us. Nature's refreshing rains and glowing sunshine made our fertile plains rich with golden harvests. Thousands from foreign shores came to us, seeking new homes in our God-blessed land. There has been work for all, plenty for all, demand for everything. The result was a feverish state of drive. Did the blast furnace have a daily output of 60 tons, alter the lines, put up new stoves, another engine, force it, blow it—better still, build another and bigger one; produce 200 tons per day! The Bessemer works were designed for and expected to make 1500 tons of ingots per week. Put on three sets of hands, let the week of production begin on Sunday afternoon; the week of labor never end, and then, not be content with a weekly yield of 3000 tons. This has been the hot-blooded life of the past few years; but following it have we not sometimes neglected true economy? If not, then well. But whether yes or no, the time is now here when we must have cheapness of production as well as quantity. I take it, no matter what may be our views on the subject of protection, the supreme duty of every engineer is to aim at placing our industries entirely independent of the whole subject. An easy statement to make—not so easy of accomplishment. But our duty remains the same. How can it be done? Most emphatically, not by placing American labor on the same basis as foreign; not by employing women and children to perform the work not of men alone, but that of beasts of burden; not by giving our workers hovels instead of homes; not by depriving them of wholesome diet; not by rendering education and advancement all but impossible; not by breaking down the barriers of morality; not by making the united efforts of a skilled man, and his equally skilled wife and daughter, capable of yielding but \$5.13 per week! I am proud to believe the reduction of labor to this point would require a plant for the construction of which the average engineering mind is incapable. Unfortunately, when pinching times afflict us, when the necessities of curtailment of costs arise, we at once attack the wages problem as the certain and only way of salvation. That point of reduction of cost is so easily reached. Understand me, I do not mean that labor should not bear its share of depression, as it certainly always will of prosperity. But if we would give deeper thought, and not permit the human proclivity for hitting some other body satisfy us, we should make greater and more lasting

savings. You may make heavy reduction in wages, and save but a small amount per ton of product, and, when times change, the reduction must be restored. But save a few per cent. of loss in the processes of manufacture, and your aggregate is the same, and that reduction in cost remains permanent. By the difference between an unintelligent, careless and indifferent use of the non-producing supplies in one engine and its train of rolls, and a conscientious effort at economy, an actual saving of \$100 per month has been possible. This is not a fortune; but if you have, say, 40 engines and 13 trains of rolls, it merits respectful consideration. Better let that master mechanic's wages remain at a fair standard, and have him save for you, than to take from him and let another lose for you. Hence, I argue that the first duty is seeking after better methods, then a rigid and economical administration, and then a revision of the whole labor question.

I think my statements as to not favoring a descent to the level of foreign labor have been sufficiently strong; but, at the same time, I claim that the relative pay of our workers is not properly balanced. The machinists, the pattern makers, the carpenters, the mechanics, of America have to serve an apprenticeship of from three to four years, receiving during that time not more than enough to pay their board. After learning their trades, they cannot hope to earn more than—and, in fact, are satisfied with—\$2.25 to \$3 per day, the latter being for exceptionally skillful workmen, \$2.50 per day being about the average. Should these men develop sufficient talent, they may become foremen, at say, \$100 per month. Their employment demands physical skill, patient toil, frequently fearless exposure to physical danger, and a certain amount of intellectual education. The greater the latter the more certain is the possessor of constant employment and success. From the daily wages stated, it of course follows that the yearly earnings are moderate. Nevertheless, in all manufacturing communities of this country you will find that the mechanics are, as a rule, the men who have acquired homesteads, who live with the most comfort, and whose children are prepared for a higher plane than that occupied by their parents. It certainly seems unjust that, as opposed to such a class of workers, other men without intellectual education, with trades that, with scarcely an exception, if sufficient physical strength is possessed, can be acquired in less than a year, should control a rate of pay from one and a half to three times as great. The young man in the machine shop cheerfully devotes his time, while learning his trade, for a compensation of some \$3 per week. His fellow in the rolling mill, if over 15 years of age, must receive from \$1.50 to \$2 per day, or he will remain in idleness. To my mind, true justice demands that the wages of the skilled mechanic should be the basis in comparison with which the rate of all other labor should be determined.

But to reach the sought-for plane, to place the manufacturers of this country in a position to compete in the open markets of the world, to render the question of tariff entirely one of revenue, one more thing is absolutely necessary: We must have cheap raw materials. No matter how much engineering skill is exercised, no matter how economical the administration, no matter how low the rewards of labor, unless the coal, the ore, the pig metal, are obtained at a far lower price than we now know, our market must be limited to our own domain, and the foreign importer must be handicapped by an impost; or else our furnaces must remain cold, our mills idle, and the mines of either my own New York or those of hospitable Virginia lie undeveloped. To give us this cheap material, other than labor must be content with smaller returns. If the ore property is acquired for, say, \$50,000, the company formed to develop it must not have a capital of \$1,000,000, and each stockholder expect at least 10 per cent on his watered investment. I fully appreciate that this is not likely to be received with favor; but if the demand is for steel rails at about \$25 per ton, to meet it the manufacturers must have pig iron at the English price of, say, from \$12 to \$13. Then, with the American converter, averaging 42,705 tons, against 20,920 for the English, and 15,001 tons for the French, per year, there need be no fear but the American product can compete in any market, and at the same time pay labor as American labor should be rewarded.

The advisability of such a policy has been recognized by at least one association of capitalists. The furnaces and mills located on the Hudson River, while possessing many advantages of location, have been handicapped by high-priced fuel. This must ever remain, and in the struggle of the survival of the fittest, there could be but one other element to offset this disadvantage. If cheap and good ore could be obtained, the distance from the coal fields would be more than neutralized. To Mr. James A. Burden, of Troy, belongs the credit of a methodical investigation, rewarded by complete success, which promises to make the Hudson Valley one of the most favorable points for the production of cheap and good iron in the United States. The gentlemen associated with Mr. Burden in the possession of the Hudson River ore property, and also the Chateaugay property, believe that their true interests point toward a large output at a small profit. Fortunately, the mixture of the Chateaugay and Hudson River ores in about equal proportions furnishes an easy working burden, and yields good foundry, mill and Bessemer irons.

Taking Troy as a point at which these ores may be brought together and smelted in properly constructed furnaces, costs can be figured about as follows:

1 ton of Chateaugay .....	\$5.50
1 ton of Hudson River .....	5.00
1½ tons of coal .....	5.00
Limestone .....	50
Oil, tools, etc. ....	1.50
Labor .....	1.50
Repairs, etc. ....	1.00
Total .....	\$15.00

It has been demonstrated that freight can be carried over our railroads and profits made at a rate per mile that a few years ago seemed impossible. Our country is one of long distances. The various raw materials are generally far apart, or else the market is distant. Hence, railroad engi-

neers and managers have already contributed their share toward solving a problem which, view it as you may, is one of at least not easy solution. The bounden Christian duty of every one, in whatever sphere he may be placed, is to properly administer the talents given unto him. The seeking after the best methods in all things is imperative on all. But have we not cause to be proud of the development of our country, and reasonably well satisfied with the results? Coming, as we distant members of this Institute do, to partake of the hospitality and witness the Aladdin-like achievements of our hosts of this section of Virginia, are we not inclined to conclude that the system which has rendered such things possible is fit to live? If so, then, gentlemen, we must resort to political as well as engineering methods.

#### PAPERS ON VIRGINIA ORES.

The first paper of the evening was that of Mr. A. S. McCreath, of Harrisburg, Pa., on "The Iron Ores of the Valley of Virginia." Mr. McCreath, as will perhaps be remembered by some, recently had occasion to examine the mineral resources along the lines of the Shenandoah Valley and the Norfolk and Western railroads, and much of the information thus gained was embodied in the paper, forming an interesting and valuable collection of data on the subject. Discussion was postponed until after the reading of a paper on "The Ores of Cripple Creek, Virginia," by Capt. C. R. Boyd, of Wytheville, Va. As both papers, however, were of considerable length, and as some time had been occupied by the various other proceedings of the evening, the time remaining for discussion was naturally limited, and few, if any, points of special note were brought out, and the meeting was brought to a close shortly after 10 p. m.

#### THE LYNCHBURG FURNACE.

Tuesday being devoted principally to excursions, a special train kindly provided by the Norfolk and Western Railroad took the visitors to Lynchburg, where the blast furnace of the Lynchburg Iron Co. was visited. This furnace, it appears, was originally designed to use charcoal as a fuel, but is at present running with Connellsville coke, yielding an average daily output of 35 tons. Further inquiry showed the stack to be some 60 feet by 12 feet 6 inches, a blowing engine having a 20-inch steam and 60-inch blowing cylinder, with 4-foot stroke, furnishing the necessary blast through four tuyeres with 4½-inch nozzles.

#### THE RIVERVILLE MINES.

Through the courtesy of the Richmond and Allegheny Railroad Company a special train had been provided which conveyed the party to Riverville. Conveyances of great variety here awaited the visitors, who were soon on their way to the Riverville iron ore mines, located about 1½ miles distant. The mines turn out a mixture of specular and magnetic ore, yielding about 50 per cent. of metallic iron, and are said to be sufficiently low in phosphorus to enable the production of Bessemer pig. Returning from the mines, the guests found an excellent lunch served by the citizens of Lynchburg, after partaking of which they returned to that city. Owing to a breakdown of the engine and the consequent delay, Lynchburg was not reached until long after the appointed hour, and the session which had been arranged for the afternoon was consequently omitted. Visits were made to several points of interest, among them the Chamber of Commerce, where a fine display of minerals was examined. Roanoke was again reached shortly after 10 o'clock in the evening.

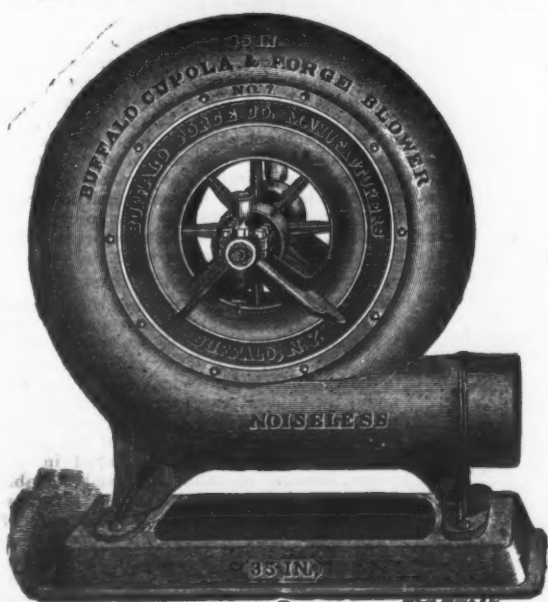
#### PAPERS.

Wednesday morning found the members assembled in Rorer Hall, at Roanoke, for the second session, the first paper read being that of Maj. Jed. Hotchkiss, of Staunton, Va., on "The Coals of the Lower Measures or Conglomerate Group in the Virginias," and also on "The Iron Ores of the Virginias West of the Appalachian or Eastern Blue Ridge." Aided by a large map, Major Hotchkiss gave a brief outline of the subject under consideration, showing the locations of the ore and coal deposits, and also giving some particulars as to the geological formation of the country. It may be well here to state that an appreciable proportion of those present departed during the early portion of the session in order to attend the visits to the Crozer Furnace, the Rorer Iron Co.'s mines and the Roanoke Machine Works. Following the papers of Major Hotchkiss was that of Mr. Edward Gridley, of Wassaic, N. Y., on "CAST IRON OF UNUSUAL STRENGTH."

Mr. Gridley stated that the smelting of carbonate ore found near the hematite mines of Amentia, Dutchess County, N. Y., produced an iron exhibiting unusual properties. About a year ago the Wassaic Furnace, of Wassaic, N. Y., made several hundred tons of iron from a mixture of two-thirds raw carbonate and one-third Chateaugay, hoping that the resulting product would be sold for steel purposes, but as it showed 180 per cent. of phosphorus it was not offered. The iron looked well and seemed quite strong, giving also good results in malleable castings. No special tests as to the strength were made at the time. About the beginning of February of this year the company began using two-thirds roasted carbonate and one-third Chateaugay ores, and, noticing that the iron was stronger than usual, two samples were tested, and the result showed that the tensile strength was 32,014 and 34,176 pounds per square inch respectively. After the stock of Chateaugay ore gave out a mixture of one-third raw carbonate with two-thirds roasted carbonate was used, and a test made of the resulting iron showed a strength of 40,008 pounds per square inch. These three tests were made by Mr. A. J. Copp and Mr. E. B. Manning, of the Phoenix Furnace, on a Riché testing machine. Since these tests were made samples were obtained from all-carbonate ores, and the results showed the following tensile strengths: 39,660, 40,816, 41,832, 42,281, 39,902 and 40,130 pounds per square inch. A sample taken from the same body of iron as No. 3 above mentioned was broken at the Ironclad Furnace, showing a tensile strength of 40,151 pounds. A sample tested on a Riché machine at the Stevens Institute of Technology showed 40,000 pounds; another sample tested at the same place on Professor Thurston's torsion machine gave the



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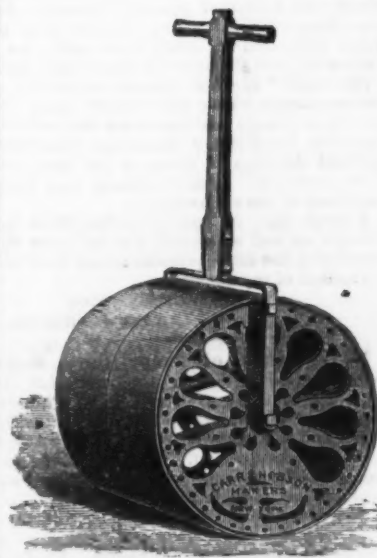
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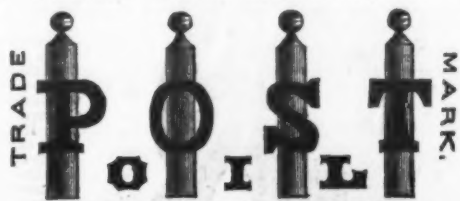
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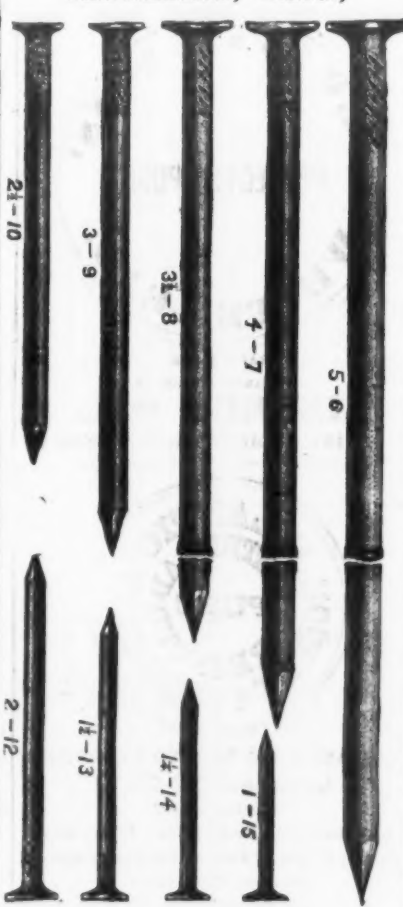
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following results: Torsion, 7 degrees; resistance, 931.38; resilience, 48.33; tensile strength, 44,500 pounds. A sample sent to Messrs. Davenport, Fairbairn & Co., of Erie, Pa., was also tested on the torsion machine, showing a tensile strength of 47,500 pounds per square inch, the torsion amounting to 9 degrees. These tests were all made from iron cast in the pig-bed direct from the furnace. Some were made from the full pig turned down, but the greater number from samples obtained by making a hole in the sand at the end of the pig from 10 to 12 inches long and 1 1/4 inches in diameter. No tests have yet been made with the remelted iron. Shortly after the above tests were made a report was received of two samples broken by Messrs. Fairbanks on their large testing machine, showing the tensile strength to be 39,068 and 41,629 pounds respectively, while the average of a series of 13 different tests gave a result of 41,349 pounds per square inch. In view of these facts it was but natural that some further particulars as to the ore and the iron obtained from it would be desirable, and, consequently, chemical analyses were made of both the ore and iron. The analysis of the roasted ore was made by Messrs. Booth, Garrett & Blair, giving the following results:

Roasted carbonate, Feb. 22, 1883.	Roasted carbonate, Feb. 22, 1883.
Silica..... 8.240	Phosphoric acid..... .275
Peroxide of iron..... 77.300	Sulphur..... .284
Alumina..... 2.768	Loss by ignition..... 5.684
Red oxide of iron..... 3.005	Metallic iron..... 54.042
Manganese..... 1.603	Manganese..... 2.165
Magnesia..... 1.167	Phosphorus..... .120

The analysis of the iron was made by Dr. Thomas M. Drown, of Easton, Pa., the results being as follows:

Analysis of iron from carbonate ore, May 26, 1883.	Total, 3.090
Graphite..... 2.310	
Combined carbon..... .780	
Silicon..... .307	
Sulphur..... .086	
Phosphorus..... .204	
Manganese..... 1.512	
Iron..... 93.700	
Total..... 99.989	

Mr. Gridley had provided a number of samples of the pig and also of test pieces that had been broken in the testing machine, and these were examined with critical interest. Questions by several as to the probable cause of this unusual behavior of the pig could not be answered. Mr. Gridley himself being unable to account for it. A paper on the "Occurrence of Copper in Pennsylvania" was then read by Dr. P. Frazer, of Philadelphia, followed by another on "The Porosity and Specific Gravity of Coke," by Mr. F. P. Dewey, of Washington, D. C. After a short discussion, bringing out nothing of special interest, Mr. E. G. Spilbury, of Lancaster County, S. C., read a paper on "The Designation Process." The session was then declared adjourned.

### THE CROZER FURNACE.

The Crozer Furnace, which was visited on Wednesday, was recently blown in, and is located about a mile from Roanoke. The stack is 70 x 16 feet, with three Whitwell fire-brick stoves, each 18 x 70 feet, and an iron draft stack 162 feet high. There are two Weimer blowing engines, each with steam cylinder 42 x 48 inches, and blowing cylinder, each 48 x 84 inches. The engine houses 42 x 35 feet; casting-house, 138 x 50 x 25 feet, built of brick, with corrugated iron roof; stock-house, 150 x 75 feet. The estimated capacity of the furnace is 100 tons per day. The ores used are chiefly those from the Crozer Steel and Iron Co.'s mines near Roanoke, the fuel being coke. The machine works of the furnace were built by the well-known firm of Witherow & Gordon, of Pittsburgh.

### ROANOKE MACHINE WORKS.

The Roanoke Machine Works, also visited, occupy a point immediately at the junction of the Shenandoah Valley and the Norfolk and Western Railroads. They consist of the following buildings: An engine house, with stalls for 20 engines, and a turn-table 75 feet in diameter; smithshop, 350 x 72 feet, with four steam hammers and one drop hammer of 3000 pounds; machine shop, 381 x 72 feet, and an annex 28 x 19 feet for stationary engine of 100 horse-power; erecting shop, 516 x 64 feet, fitted for the erection of engines, &c.; foundry, 252 x 72 feet, with two cupolas, three molding machines, hydraulic cranes and a brass foundry. Car-wheels and other castings will be made in this building; freight-car erecting shop, 408 feet in diameter, with central turn table of 100 feet diameter, and having 20 railway tracks in the building, each capable of holding two freight-cars; planing mill, 250 x 72 feet, with engine-room, &c.; storehouse, 165 x 72 feet, two stories, with hydraulic hoists. The buildings are all of brick, and iron roofing frames and slate roofs, and are supplied with a complete outfit of all the most modern appliances, so that only the very best character of work may be turned out.

### AT BLUE RIDGE SPRINGS.

These and the excursion to the Rorer Iron Co.'s mines, about five miles distant from Roanoke, occupied some four or five hours, at the end of which a special train on the Norfolk and Western road took the visitors to Blue Ridge Springs. Here a number of others joined the party, which then proceeded to the Houston and Upland ore mines, after the inspection of which, the train returned to Blue Ridge Springs, where an evening entertainment had been arranged by the citizens of Roanoke. A large number sat down at the well-supplied tables, and the many tempting delicacies met with due appreciation. While a number of the younger guests joined in a dance, the members of the Institute held their third session, the first paper read being that of Mr. J. F. Witherow, of Pittsburgh, on "The New Blast Furnace of the Crozer Steel and Iron Co." Prof. C. H. Hitchcock's paper on "The Geological Position of the Philadelphia Gneisses," which was then called for, elicited considerable discussion, and was terminated only by the lateness of the hour and the amount of business yet to be transacted, this being the last session of the meeting. The deaths of two members of the Institute were then duly noticed—we refer to Professor Gruner, of Paris, the eminent metallurgist, whose life and career were briefly sketched by Dr.

Egleston, and Mr. James Park, Jr., of Pittsburgh, to whose memory an eloquent tribute was paid by President Hunt.

The secretary was then called upon to read the names of the applicants for membership and the titles of the remaining papers announced for this meeting. These were: "Repairs and Improvements at Cedar Point Furnace, Port Henry, N. Y.," by T. F. Witherow, of Port Henry. "Recent Improvements in the Metallurgy of Zinc," by Dr. T. Egleston, of New York City. "Leaching of Gold and Silver Ores in the West," by Dr. T. Egleston. "The Apollon Oven for Coking Coal," by Dr. T. Egleston. "The Schwartzkopf Control and Safety Apparatus for Steam Boilers," by C. A. Stetefeldt, of New York City. "The Shelf Dry Kiln," by C. A. Stetefeldt. "The Coals of Pocahontas, Virginia," by Capt. C. R. Boyd. "The Treatment of Slimes," by F. G. Coggin of Lake Linden, Mich. "Boilers and Boiler Settings for Blast Furnaces," by F. W. Gordon, of Pittsburgh, Pa. "The Timber of West Virginia," by Prof. S. P. Sharples, of Boston. "Notes on the Geology of Alabama," communicated by Dr. W. R. Raymond, of New York City. "The Langdon Gas Producer," by N. M. Langdon, of Chester, N. J. "Determination of Manganese," by Magnus Trolldenier, of Philadelphia. "Russell's Improved Process of Lixivating Silver Ores," by C. A. Stetefeldt, of New York. "On the Copper Rocks of South Mountain," by C. H. Henderson, of Philadelphia. "On the Volumetric Determination of Manganese," by Messrs. Beebe, Colby and Mackintosh, of New York. "On the Iron Ores of Eastern United States and their Geological Horizons," by Prof. J. C. Smock, of New Brunswick, and "Notes on the Construction of Chimneys," by P. Barnes, of Elgin, Ill.

Resolutions of thanks were then passed to the citizens and ladies of Lynchburg and Roanoke, to the Shenandoah Valley, the Norfolk and Western, and the Richmond and Allegheny railroads, and to all individuals and corporations who had extended courtesies to the Institute. The meeting was then adjourned, and having returned to Roanoke, everybody was actively engaged in making preparations for the two following days, which were to be devoted exclusively to excursions to the Flat Top coal fields, the Cranberry Mines and other points of interest.

### THE NEW RIVER DISTRICT.

An early start was made on Thursday morning, the party proceeding to New River, where another train on the New River branch was taken for Pocahontas. The extensive coal mines at this place formed a subject of considerable interest and favorable comment, attention being also given to the numerous coke ovens now erected and partly in course of construction at that place. A lunch which left nothing to be desired, both as to variety and excellence, was here furnished, and after having satisfied the wants of the inner man, the train was taken for Wytheville, where the night was passed. The hotel accommodations of this place were naturally insufficient for so large a party, but the hospitable citizens came to the rescue, and everybody was soon comfortably situated. On Friday morning a special train on the Norfolk and Western Railroad was taken for Bristol, some 150 miles distant from Roanoke; here another train, on the East Tennessee, Virginia and Georgia Railroad, conveyed the party to Johnson City, about 22 miles distant, and from this point the Cranberry Mines were reached by a narrow-gauge road about 30 miles long. These mines, as may be known to some, yield a very pure magnetic ore, low in phosphorus and practically free from titanium. No very great development has been attained thus far, but the near future will, beyond all doubt, witness extensive mining operations in this locality. Fatigued with the day's journey, but at the same time well pleased with what had been seen, the party returned to Roanoke, arriving at a late hour of the night.

### HOMEWARD.

Saturday morning found the great proportion of those who had attended the meeting assembled at the Roanoke depot previous to their departure to their homes. A hasty good-bye to friends and acquaintances, a last glance at the cheerful little town where so pleasant a week had been spent, and the train whirled out of sight around one of the many curves that characterize the road through the picturesque Shenandoah Valley. Here and there at different points along the road, homeward-bound visitors left the train, having reached their destinations, and when New York was reached only a small proportion remained of those who had enjoyed the hospitality of Roanoke and vicinity.

### The Barbed-Wire Patents.

In our last issue we gave a brief abstract of the decision of Judge Treat, of the United States Circuit Court at St. Louis, against the validity of the barbed-wire patents owned and controlled by the Washburn & Moen Mfg. Co. In the Missouri circuit the cases brought by the Washburn & Moen Mfg. Co. were seven in number. Two of them were against the users of machines alleged to be infringements, and five were against dealers in the manufactured wire. The latter suits were against Henry Fuchs, the Simmons Hardware Co. and John W. Gates, while the former were aimed at Henry Fuchs and Gustave Griesche. Separate opinions were given in the suits in which the products were concerned and those in which the machines were involved. The full text of the opinion covering the matter of the product is as follows:

It will be seen that the points are not the same in all respects in each case. Some involve solely the validity of the Kelly patents, and some the Gliddon patents, with the alleged infringements, respectively, as to each of said patents. Inasmuch as the Washburn & Moen Mfg. Co. are the sole assignees of the Kelly patents, and said company, together with Elwood, are assignees of the Gliddon patents, the cases have to vary accordingly. It seems from the report—4 Fed. Rep., 900—that many elements of the cases now to be considered underwent elaborate review before that United States Circuit Court. The different relationship of the plaintiffs, as assignees, has caused the diversity of suits. The general propositions



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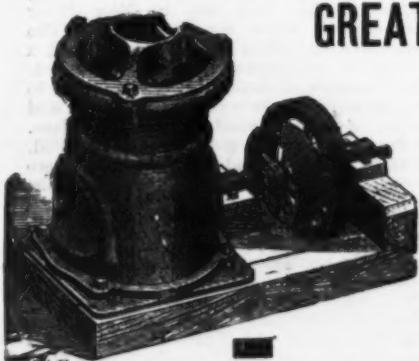
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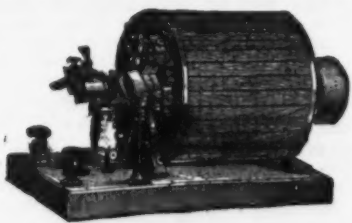
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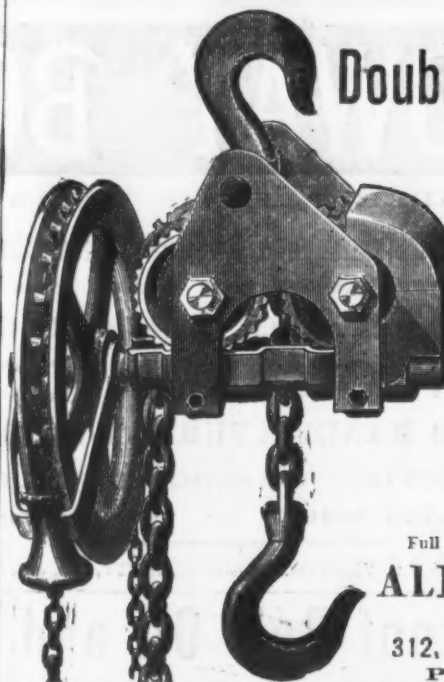
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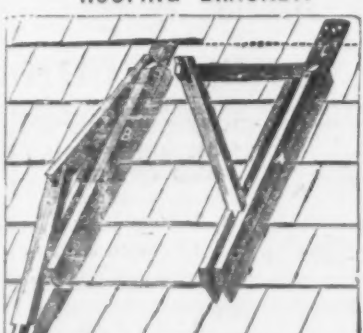
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controlling all of these suits may properly be considered, without detailing further the specific differences between them; for if the conclusions reached are correct, they cover all the pending motions. The arguments were, by desire of the Court and of all the parties, extended far beyond what is usual on motions of this kind. They went into a full consideration of the validity of the various reissues and the question of infringement. Acting upon the suggestions of counsel, and being fairly advised of the main points at issue, this Court does what it is seldom willing to do—viz., express somewhat *in extenso* what ordinarily would be reserved for final hearing. This is the more cheerfully done because like motions are pending in other courts of this circuit, and uniformity of decision should be had. It has been deemed proper, in the interest of all concerned, that there should be the fullest interchange of views among the judges in this circuit before whom like motions are pending, so that the views here expressed might not be in conflict with those of other courts in this circuit, but that these might be presented as test cases.

The Hunt and Smith patents were commented upon in the case against Haish, 4 Fed. Rep., 900. The use by Hunt of a pointed sheet, with a hole punched therein, to be strung on a wire or rope, and by Smith of a bend or curve in the wire to prevent the slipping of the pointed sheet or barb, is outside of the questions now presented, except to the extent that they show the state of the art when Kelly's original patent was granted. It is clear that Hunt contemplated only the stringing on wires or ropes of his pointed sheet barbs, punched in the center as stated. Such punched sheets could not retain, distributively, their position along the wires or ropes. Hence Smith suggested the bending of the wires at stated intervals, so that the sheet barbs might be thus distributed.

Such was practically the state of the art when Kelly conceived the plan of hammering or compressing the sheet barb on the fence wire, so that the same could not slip, thus making rigidly a barbed wire of barbed sheets fastened to the fence wire before or after the fence wire was strung in place. There was a common thought, viz.: the use of such punched sheets strung along a rope or wire. Next by Smith a mode of keeping such barbed sheets in position, and then the compressing mode by Kelly.

In the light of these suggestions the Court is brought to a consideration of the Kelly and Gliddon patents, and of their respective issues. It has been deemed advisable, instead of giving a separate opinion in each of the cases, some depending on one and some on another reissue, to treat at the same time all the patents involved, for the conclusions reached affect all alike. The Kelly patent, No. 74,379, date February 11, 1868, was for a combination by which a plate of iron or steel was strung on a wire and fastened by a blow or compression, so as to flatten the opening and fasten it to the wire. Said plate had sharp thorns or points. It was stated that the wire might be put up with the thorns previously attached and secured, or put on loosely and distributed and secured after the fence was erected. The former—that is, fastening of the barbs to the wire before the fence was erected—was stated to be preferred. This clause appears in the specification: "I can, where it is desirable to increase the strength of the wire, lay another wire of the same or different size alongside of a thorn wire, and can twist the two together by any suitable mechanism. Fig. 2 is referred to. It tends to insure a regularity in the distribution of the points in many different directions." The Kelly reissue, No. 6902, dated February 8, 1876, contains claims, the first and fourth of which are alone involved in this suit. To ascertain their effect reference must be made to the specifications in the reissue. Its specifications suggest that the twisted wire will lock the thorn, and insure a regularity in the distribution thereof. The original patent suggested only the twisting of the second wire to strengthen the first wire on which the pointed plates were strung and made rigid by compression. It is obvious that the combination in the original patent did not include any other than the thorn plates and the mode of fastening them in the way stated, without reference to any use of the twisted wire with respect thereto.

Under the reissue the first claim is substantially the same as in the original patent, which the defendant has not infringed. The fourth claim of the reissued patent is for twisting two wires and a series of thorns strung upon one of the wires, and held in position by them, as set forth—that is, by compression. The original patent for the fixed barbed plates, made by hammering or otherwise, did not contemplate defendant's form or barb, or the use of a twisted wire to keep such barbs in position. If, therefore, the reissued patent 6902 is to be considered as covering more than the mode of fastening the plate barbs to the wire in the combination stated, and as extending the use of the twisted wire so as to include its use for the distribution and locking of all kinds of barbs, then said reissued patent is invalid as to said extension, because it was not included within the scope of the original invention, and also because if there were any inadvertence, &c., the patentee, under the recent decisions of the Supreme Court, was too late in correcting the alleged mistake, &c. The result is that said reissued patent is invalid so far as the same may be supposed to cover the use of a twisted wire to lock and keep barbs in position. Also, that the defendant's product, both as to the barb and the mode of fastening or distributing the same, is entirely outside of the Kelly patent or its reissue. In the original Kelly patent, the specification of which is above quoted, there is nothing to indicate the use of a second wire, twisted, for locking purposes. The means of keeping the plate or barb in position was entirely distinct from the strengthening of the fence wire by twisting around it a second wire.

Prior to the Kelly reissue, February 8, 1876, other constructions of barbs and their connection with a second and twisted wire to lock barbs of different construction had been patented or applied for. Hence the attempt in the Kelly reissue to broaden the original patent to cover what was not included in or suggested by said original patent, more espe-

cially in the light of subsequent inventions and of his laches, renders the reissue invalid. His reissue was subsequent to the Gliddon patent. True, in the specification of his reissue, he says: "Where it is desirable to increase the strength of the wire I lay another wire of the same or different size alongside of a thorn wire and twist the two together by any suitable mechanism. This construction is represented in Fig. 2. It locks the thorn and also tends to insure a regularity in the distribution of the points in many directions." It will thus be seen that the purpose of the second twisted wire was suggested in the reissued patent to have a purpose not hinted at in the original. Indeed, if the barb plate was rigidly attached to the fence wire, which was the main object of the original invention, the second wire could accomplish no other purpose, as stated, than to strengthen the first wire, for the barb plate was already by the contrivance named rigidly fixed. In the original patent the second claim was for "the thorn E and wire D combined in the manner represented, and adapted for use in a fence herein set forth." That was for a combination of the thorns and wire, the thorns having been by compression fixed to the wire either before or after the wires were strung on the fence, the second wire performing no other function than strengthening the first wire. There was no locking suggested, nor mechanically could it be otherwise than useless for locking purposes, inasmuch as the locking had been provided for by compression.

It is contended that the first and fourth claims of the Kelly reissue are not only for the same invention covered by the original patent, but practically cover any use of a second or twisting wire by which the barb plates or series of thorns can be held in position, distributively, along fence wires, whether the thorns are by perforated plates or short twisted wires in loops. The first claim of the Kelly reissue is in these words: "I claim the combination substantially as described of the fence wire D, and a series of thorns, E, rigidly fixed thereto for the purpose herein set forth"—that is, the same combination mentioned in the original patent as already described. The fourth is in these words: "I claim the combination substantially as described of two wires, D D, twisted together and a series of thorns, E, strung upon one of said wires and held in position by them as and for the purposes set forth." It is evident that if the use of the second wire was to lock the thorn without the compression of the barb plate, then an entirely new device had been inserted into the old combination. It can hardly be contended that the combination of either the original or reissued patent covered all possible forms of barbed plates, or barbs or points which might be used in any combination irrespective of compression where twisted wires were to be used. Hence the result of this examination is:

1. The reissued patent is expanded, unlawfully, to cover what was not a part of the original invention or combination. 2. That inasmuch as the use of the second or twisted wire for locking purposes without compression or perforated barbed plates had in the meantime been patented or applied for, and inasmuch as there was no inadvertence, accident or mistake to be corrected, it is obvious that the reissued Kelly patent is invalid, because not only of the laches of the patentee, but also because it is broader than the original invention. It evidently was intended to cover subsequent inventions, and by expansion appropriate the inventions of others, thus coming within the denunciation of the Supreme Court as to reissued patents so broadened.

The next patent under consideration is reissue No. 6913, February 8, 1876, being a reissue of patent No. 150,683, May 12, 1874. The claim in the original patent is in these words: "The combination of the wires B, C, slotted tube G, coil spring L and post X, for keeping the wires in proper tension in various temperatures as described and shown." The combination was for wires extended longitudinally, clasped at intervals by spurs, leaving the wires intermediately in an elliptical form, whereby said spurs would be retained in position and said wires, passing through the slotted tube with its coil spring, would be kept in proper tension as the temperature varied. Of course, the clasping by said spurs was not designed to be so rigid as to prevent the operation of the slotted tube from permitting expansion and contraction. Neither the specifications and drawings nor "claim" are for the mode of interlocking barbs or spurs by means of a twisted wire. The original patent was for an entirely different mode of using spurs, and was for regulating the expansion and contraction of the wires—a combination complicated in its character and requiring a slotted tube and spring as described in it. There was nothing either in the drawings or specifications to indicate what is claimed in the reissue thereof. As to the reissue of February 8, 1876, No. 6913, it is impossible to read it without observing that it was broadly expanded to cover what was not even hinted at, or in anywise suggested, in the specifications of the original patent, or in the claim thereof. The claim in the reissue is: "In combination with a fence wire, a barb formed of a short piece of pointed wire, secured in place upon the fence wire by coiling between its ends, forming two projecting points substantially as specified."

Thus, an original combination of two wires, not twisted, but looped by spurs at intervals, connected with a slotted tube and springs to regulate expansion, is by the reissue sought to be converted into another or new combination, whereby the looping of the wires, the use of the spurs with respect thereto, the slotted tube and spring disappear, and an entirely new combination is presented, namely, the close twisting of two wires, with spurs interjecting at stated intervals and locked in position by the second or twisting wire. A new position and use of the wires are thus presented, a new arrangement of the spur or barb in connection therewith, and the absence of the slotted tube and spring. The purpose of providing for expansion disappears. The views thus expressed receive special cogency from the fact that on November 24, 1874, Gliddon obtained Patent 157,124 for an invention the claim of

which is in these words: "A twisted fence wire having the transverse spur wire D bent at its middle portion about one of the wire strands A of said fence wire, and clamped in position and place by the other wire strand A twisted upon its fellow, substantially as specified." It is contended that the prior patent of May 12 contained the invention of this later patent. If so, why did Gliddon take a second patent for what was already embraced in his former patent? Did not the taking of the later patent necessarily imply that he had no prior patents therefor—that the two inventions were wholly different? It is contended that as the application for the later patent was made prior to the application for and issue of the earlier patent, and that as by the rules of the Patent Office a reissue, if desired, had to be made for the patent first granted, therefore the patentee is entitled to go back to his first application and thus take out his claim for a reissue, as if both patents were combined in one. Great stress has been laid on this point. It is obvious that the Gliddon reissue 6913 of itself was altogether too broad to be sustained unless it is permissible to go behind the original patent of May 12, 1874, and help out the same by reference to an application under which a later patent was issued.

This Court is not prepared to accede to any such view of the law, whereby several patents can be combined into one for the purpose of enabling a patentee to secure a reissue of a specified patent for an invention not contained in the original. It appears to the Court that the reissued Gliddon patent was for an entirely different invention than that claimed in his original patent. It also appears that he was fully aware of that fact, because he received the later patent of November 24, 1874, and now claims to expand his prior patent of May 12 to cover this later patent. It would seem there was no "inadvertence, accident or mistake" in the patent of May 12, entitling him to the reissue, but merely a bold attempt to cover, under the form of a reissue, another and an entirely distinct and patented invention. The conclusion is that both reissued patents are void.

The attempt to justify the reissued patent of May 12, 1874, by invoking the prior application, October 27, 1873, for the patent of November, 1874, falls within the reasoning of the United States Supreme Court—11 Wallace, 516—the statement wherein is the converse of that now under review. That Court said: "Where the thing patented is an entirety consisting of a single device or combination of old elements incapable of division or separate use, the respondent cannot escape the charge of infringement by alleging or proving that a part of the entire thing is found in one prior patent or printed publication or machine, and another part in another prior exhibit, and still another part in a third one, and from the three, or any greater number of such exhibits, draw the conclusion that the patentee is not the original inventor of the patented improvement." If this be true as to the nature of a combination when an infringer seeks to defeat the same, why is it not equally true where a reissue is sought to be upheld, under an original patent, by importing into the reissue devices not suggested in the original, making thereby a new combination distinct from the original? In other words, the reissue must be confined to the original "combination," and cannot be expanded to make a new combination by introduction therein of devices, new or old, not included in or suggested by the original—Munson vs. Gilbert, 3 B. & A., 595. It must be borne in mind that the Court is dealing with a "combination" patent, and that under pretense of a reissue a new combination cannot be upheld. Therefore, the several motions for preliminary injunctions are overruled.

#### INFRINGING ON MACHINES.

In giving his opinion on the cases in which the use of infringing machines was alleged, Judge Treat said: "Each of plaintiff's patents is for 'combination,' and not for a single or specific device. It does not appear distinctly what, if any, new devices were used in the combinations, and certainly there is in neither a claim for a new device separate from the combinations." After a discussion of the doctrine of "combinations" and the particular ones involved, the Judge concluded his opinion as follows: "The devices and arrangements in combinations, whether of the Ross or Stevens patents, are not the same as in the defendant's patent in important particulars, and do not operate in the same mode, it being admitted and apparent that the feeding mechanism operates in the Ross and Stevens patents intermittingly and in the defendant's constantly. Suppose defendant applied for a patent as an improvement on the Ross or Stevens machine, in what would his improvement consist? If he discarded the former combination instead of adding thereto, would not his combination be a new one, instead of an improvement on the old one? If he omits some of the old elements, then he does not infringe. If he uses the same elements in the same combination he does infringe, although some of the elements differ in form or modes of immediate operation, provided they are known mechanical equivalents. If, on the other hand, he omits some of the devices in the original or patented combination, and substitutes therefor, not a known mechanical equivalent, but an entirely new device, whereby a more beneficial result is effected, his combination is a new one, and not to be excluded from competition with the old."

"It appears that defendant's machines follow none of the combinations under which plaintiff's claim. It is very different in many of its devices from those in the Ross patents; and although it apparently approaches nearer in its feeding mechanism to the Stevens patents, yet it changes essentially some of the parts of the Stevens combination, and in so doing practically reverses the operation, and accomplishes what the Stevens machine could not effect so beneficially. If the views here intimated are not to obtain, then the road to all new inventions for feeding barb wire is closed. These motions were more fully argued than is usual, and it remains merely to state that, as at present advised, no infringement is sufficiently

shown. At the final hearing the Court may be more fully informed upon the merits of the controversy, and reach a different conclusion from what is now suggested. As the cases now stand, the motions for provisional injunctions are denied."

#### INJUNCTIONS DENIED IN IOWA.

KEOKUK, IOWA, June 11, 1883.

Judges McCready and Love forwarded to the Clerk of the United States Circuit Court at Des Moines to-day an order in the barbed-wire cases of the Washburn & Moen Co. vs. Rhodes and others, denying several applications for preliminary injunctions for infringement of the reissued Gliddon and Kelly patents. No opinion was written. The judges here have deemed it advisable to suspend their judgment on the cases which were argued in chambers at Keokuk some time ago, until similar motions involving the same questions shall have been passed upon by Judge Treat, at St. Louis. The court here did not desire to forestall argument and anticipate the judgment of that court. Both Judges McCready and Love find Judge Treat's opinion in accord with their own judgment as to the validity of these patents.

#### INDUSTRIAL ITEMS.

##### NEW HAMPSHIRE.

At the first meeting of the Portsmouth Machine Co. the capital stock was fixed at \$100,000, all of which has been subscribed. The company was organized with Frank Jones, president; W. H. Hackett, clerk, and C. H. Mendum, treasurer, and will build a two-story brick machine shop, 204 x 72½ feet, on the site of the burned Kearsage Mill.

##### VERMONT.

The Pittsfield Iron and Steel Co., of Pittsfield, Vt., have sold their property to a syndicate in Boston which is represented by B. F. Brown. What will be done with the property is undecided.

##### MASSACHUSETTS.

The manufacture of tacks and nails has just been commenced by Reed & Prince, of Kingston. The concern has no connection with the tack manufacturers' combination, and has at present 12 machines in active operation, with all the facilities and appliances for turning out good work. The members of the firm are both men of long practical experience.

The Lynn Machine Co., at Lynn, is a consolidation of two concerns, one represented by J. M. Taylor, millwright, and the other by Amos Holbrook, machinist. Mr. Holbrook is president and Mr. Taylor treasurer of the new company. Both of these gentlemen have been in business in Lynn over 20 years, their special line of business now being the manufacture of shafting, elevators and mill work. Mr. Holbrook has had years of experience in designing, inventing and in working out inventors' ideas on new machinery, and in this department he has been very successful. The company have lately purchased all the tools and fittings of the late Holly Steam Co., of Lynn, and are now under the supervision of Mr. J. R. Barker.

At Cheshire, the Berkshire Glass Mining Sand Co.'s facilities have been greatly increased, giving them control of the Gordon bed, the Brown bed and the new bed near the reservoir which was opened about a year ago.

Messrs. A. G. Tompkins & Co., Boston, have just finished their new rolling mill at Danversport, which takes the place of one which was destroyed by fire in January last. The new mill is 150 x 100 feet, and has one 8-inch and one 14-inch train.

##### CONNECTICUT.

The machines and stock of the Waterbury Pin Co., whose doors have been closed, have been purchased by the Manufacturers' Pin Co., of New York, more commonly known as the Pin Combination.

##### PENNSYLVANIA.

The Philadelphia and Reading Railroad Co. are enlarging and making extensive improvements at their Reading machine shops. The foundations have been begun for a blacksmith shop 300 feet long. A large number of the recently suspended hands have been reinstated.

The Greenville mill of P. L. Kimberly & Co. was idle last week for repairs.

Lock Ridge Furnace, of the Thomas Iron Co., has been blown out.

The Scranton Steel Co. now have their works in Scranton in nearly full operation. In the rail mill three steel rails are rolled at once, and four will be rolled at once when the mill is in full operation. The works use as fuel culm or coal dust from a mine close by, which is burned on a patent grate. This fuel costs only 10 cents per ton at the mine.

The Dickinson Mfg. Co., of Scranton, have been awarded the contract to furnish the Calumet and Hecla Mining Co., of Lake Superior, Mich., with a steel boiler 90 inches in diameter, 36 feet in length, and to carry 150 pounds pressure. The total weight of this boiler will be 108,000 pounds, and the casting for it will weigh 10 tons. It will have 199 three-inch tubes.

The Altoona Iron Co. have shut down their works, and it is not stated when they will start up again. They have no orders ahead, and have a large stock on hand. The stoppage throws out of employment about 400 men, who are dependent upon the company more or less for sustenance.

The Blandon Rolling Mill, on the Eastern Pennsylvania Railroad, has started up again.

The Mahoning Coke Works, which were advertised to be sold at sheriff's sale recently, were not sold. They will not be put up again until September.

Mount Joy Gray Iron Casting Co., Mount Joy, Lancaster County, are manufacturing a line of specialties which have been met with much favor in the hardware trade. Stauffer's patent porch support is one of these, and, being adjustable, is exceedingly useful. Sholl's reversible blind and shutter drop hinge is another specialty. The advantages claimed for them are that either part of the hinge will do for either right or left, doing away with the inconvenience of sorting before applying to the shutter or

frame. They are also said to drop deeper and lock more securely than any other similar hinge.

Marsh & Co., of Mount Joy, who are well known as manufacturers of land rollers, reaping machines, &c., have recently commenced building portable engines. Those sent out appear to have given entire satisfaction, and new orders are coming in quite freely.

John Best & Co., Lancaster, report business very active, the demand having been in excess of their fullest capacity for months past. They manufacture portable engines, boilers, grist and saw mill machinery, and agricultural implements generally.

The Keeley Stove Co., at Columbia, in addition to their trade in stoves, are now successfully manufacturing pulleys and hangers of all sizes. The experience and facilities which the company enjoy as iron founders, in connection with their exceedingly commodious premises, enable them to fill orders promptly, and there is little doubt that they will be as successful in this department as they have been in the stove trade.

#### PITTSBURGH AND VICINITY.

A. Garrison & Co. have just sent a train of 3-high plate rolls, 31 x 112 inches, to the Springfield Iron Mill. They are building rolls for the Maumee Rolling Mill Co., Toledo, Ohio.

Dilworth, Porter & Co.'s mill has again begun operations. During the shut-down many extensive repairs and improvements were made to the mill.

The charter of the Beckwith Carbon Co. has been filed. The company will be located at Pittsburgh, and will manufacture carbon points and plates for electrical purposes and crucibles.

Work has been commenced in the Lillie Stove Foundry, Millvale. The new firm have bought and will use the stock of patterns lately belonging to James Marshall & Co.

The firm of D. W. C. Carroll & Co. has been dissolved by the withdrawal of Mr. R. G. Jones. Mr. D. W. C. Carroll will continue the business under his own name.

#### OHIO.

Mt. Vernon Furnace, at Ironton, has blown in.

The Akron Polishing and Plating Works have been bought by Mr. G. W. Smith, of Salem, who will continue the business on the same scale.

The foundation of the new addition to the Bellaire Goblet Works, 40 x 45 feet, is completed, and the framework is being rapidly pushed.

The Ironton Register says: "All the furnaces in the Hocking Valley have been shut down with one exception, and some of them will not be fired again until there is an advance in the prices of iron."

It is stated that the New York and Ohio Iron and Steel Co. are contemplating the advisability of shutting down their furnace and purchasing pig for their own use.

The Watt Mining Car Wheel Co., Barnesville, have just completed another addition of 20 x 40 feet to their works, in which they have placed a trip-hammer and some other labor-saving machinery. They are working full time on their specialty, self-rolling mine car wheels and mine cars.

The starting of the big sheet mill at the Ward Mill, at New Philadelphia, will take about 30 more employees from Niles to that place.

Some of the puddling furnaces are up at the new Kelly Nail Mill, Ironton, and work is progressing rapidly.

At a meeting of the creditors of the Graffton Iron Co., held in Pittsburgh, an extension was granted, and the works will continue operations.

Under the new organization by the Cleveland stockholders of Brown, Bonnell & Co., the firm will be known as the Brown-Bonnell Co. Stock-taking has been completed at the mills, and the whole establishment is running, including the two furnaces.

#### MISSOURI.

The Eagle Machine Works, of St. Louis, has been incorporated, and is now the Eagle Machine Works Mfg. Co. The capital stock is placed at \$20,000.

The Western Stove Mfg. Co., of St. Louis, are now occupying their new molding room, and have increased their working force. They are now turning out 15 or 20 stoves a day above their former output.

The Missouri Boiler and Sheet Iron Works, O'Brien & Smith, proprietors, of St. Louis, are now being enlarged to double their present size and capacity by the taking in of an adjoining building. They are now putting in considerable new machinery, the latest piece put in being a Long & Allstatter (Hamilton, Ohio) combined punch and shear, weighing 29,000 pounds. This machine is capable of cutting and punching iron of a thickness of 2 inches.

The Hooker-Colville Steam Pump Co., of St. Louis, are now fairly settled down in their new and handsome works, in which they expect to turn out about 2000 pumps of all sizes per annum. They are running nights on orders for several large compound condensing engines for heavy duty.

#### ILLINOIS.

The Sperry Electric Light, Motor and Car Brake Co., of Chicago, have recently added a quantity of machinery to their plant, preparatory to entering into the manufacture of electrical apparatus.

John Mohr & Son, of Chicago, are building two 25-ton galvanizing pots for the Union Galvanizing Works, of that city, and have a number of boilers to construct for other parties.

#### VIRGINIA.

The new Crozer Furnace at Roanoke made a very successful start on the 28th of last month. The first cast was a gray forge of fine quality and great strength, weighing about 8 tons. The daily output is expected to be from 80 to 100 gross tons. The sales agency has been placed with Rogers, Brown & Co., of Cincinnati.



## Special Notices.

## LATE PUBLICATIONS.

*Brown, Walter L.—Manual of Assaying Gold, Silver, Copper and Lead Ores.* 318 pages, illustrated, 12mo, cloth; 1883 . . . \$1.75

This volume contains practical information to enable any one with a little practice to assay ores that are supposed to contain gold, silver, copper or lead. The book is comprised in three divisions. The first describes and illustrates all apparatus required; it also describes the reagents and how to prepare and test them. The second part is devoted to the assaying of the ores of the four metals mentioned. In the third part many special processes are included, as the assay of gold and base bullion, amalgamation, pan and chlorination tests, copper analysis, testing of minerals, &c. Useful tables of weights, and for reference a list of books bearing on geology, mineralogy, metallurgy, &c., are included.

*Thurston.—Materials of Engineering.*

By Robert H. Thurston, C. E., Professor of Engineering, Stevens Institute of Technology.

*Part II, Iron and Steel;* 143 illustrations, 680 pages, 8vo, cloth; 1883 . . . \$5

In this, the second volume of Professor Thurston's important work on the materials of engineering construction, the author has included a large amount of practical information not heretofore available without consulting many different authorities. The ores of iron, their classification, analysis and reduction have received thorough treatment. The construction and management of blast furnaces and the different operations connected therewith are comprehensively detailed. The subject matter comprehends all the practical operations employed in the manufacture of iron and steel, so simply expressed as to be readily understood by those of limited education. There are several chapters upon the strength, elasticity and resistance of the metals treated, under the effects of time, temperature and repeated strain, with the necessary formulae and diagrams. The work is valuable not only as a text-book for the student and engineer, but equally so as a work of reference for the manufacturer and mechanic. Considerable space is given to the most approved methods of manufacturing malleable iron, and the tests of iron and steel are carefully considered and illustrated by recent examples.

Sent postpaid, on receipt of price, by

**DAVID WILLIAMS,**

Publisher and Bookseller,

83 Reade St., NEW YORK.

## For Sale.

## "ACME" BOLT CUTTERS.

6 Single Bolt Cutters, cutting from  $\frac{1}{4}$  in. to 1 in.  
3 Single Bolt Cutters, cutting from  $\frac{1}{4}$  in. to  $\frac{1}{2}$  in.  
12 Single Bolt Cutters, cutting from  $\frac{1}{4}$  in. to  $\frac{1}{2}$  in.  
2 Single Bolt Cutters, cutting from  $\frac{1}{4}$  in. to  $\frac{1}{2}$  in.  
1 Single Bolt Cutter, cutting from 1 in. to  $\frac{3}{4}$  in.  
6 Double Bolt Cutters, cutting from  $\frac{1}{4}$  in. to  $\frac{1}{2}$  in.

With or without Automatic Motion.

**NUT TAPPERS,  
BOLT POINTERS, &C.**

Specialist in All Kinds of

**BOLT and NUT MACHINERY.**

**NOVELTY IRON WORKS,  
CLEVELAND, OHIO.**

CORRESPONDENCE IS SOLICITED  
with parties having

**MACHINERY TO BUILD,**  
Heavy work preferred.

Address  
**THE HARTFORD ENGINEERING CO.,**  
Hartford, Conn.

## For Sale.

One-third or one-half interest in a large Foundry and Machine Works now doing a large and paying business. Located in one of the largest and most rapidly growing towns in the South. Indispensable that the party should be a No. 1 office man and financier.

Address "FOUNDRY 44,"  
Office of The Iron Age, 77 Fourth Ave., New York.

## WANTED.

Situation by practical Sheet Steel Roller. Had 25 years' practical experience.

Address "STEEL,"  
Office of The Iron Age, 77 Fourth Ave., New York.

## WANTED.

A situation as Inspector of Iron, by a man who has had several years experience in the manufacturing of iron. Reference given.

Address BOX 303,  
Pittsburgh, Pa.

**AN ENERGETIC** man, with business experience, good address, and practical knowledge of iron manufacture, would like to connect himself with reliable party in iron brokerage business.

Address "ENERGY,"  
Office of The Iron Age, 220 S. 4th St., Philadelphia.

## Special Notices.

## LOVEGROVE &amp; CO.,

152 N. Third Street,  
**PHILADELPHIA,**

HAVE FOR SALE A LARGE STOCK OF

**NEW AND SECOND-HAND  
ENGINES & BOILERS**

**AND MACHINE TOOLS,**

AT VERY LOW PRICES. ALSO,

**One 700 lb. Steam Hammer,**

FERRIS & MILES,

In first-class order, at very low prices. Write for prices, stating what you want.

OFFICE OF THE COMPTROLLER,  
CITY OF ALLEGHENY, PA.

May 28, 1893.

**NOTICE TO BUILDERS OF WATER  
WORKS PUMPING MACHINERY.**

Sealed proposals and specifications will be received at this office until 3 p.m. Monday, June 28, 1893, for the construction and erection of three (3) Four Million or two (2) Six Million Pumping Engines, to be located on Water Works property, River Avenue, Eighth Ward, Allegheny, Pa. The specifications will include all necessary excavating and masonry for foundations for Pump Well, also foundations for Engines and Engine House. (The erection of Pump House to be done by the city.)

The Pumping Engines to be vertical, with outside packed plunger pumps, and to be of a combined capacity of twelve million gallons, pumped against a head of 220 feet in 24 hours, with a piston speed not exceeding 120 feet per minute.

The guaranteed duty must be given on the evaporation of the present boilers now in use at works.

The contractor must furnish specifications and detail drawings of Engines, also plan of Pump Well and foundations for Engines.

The whole to be erected and completed in eight months from signing of contract, in accordance with such plans as may be selected by the Superintendent of Water Works and approved by the Water Committee and Councils of the City of Allegheny, Pa.

No proposal will be considered unless in accordance with the above and accompanied by a bond equal in amount to the bid.

All information in regard to the above work will be furnished by Edward Armstrong, Superintendent of Water Works, City Hall, Allegheny, Pa. The Committee on Water reserve the right to accept or reject any or all bids.

JAMES BROWN,  
Comptroller.

**HAVING** decided to devote ourselves exclusively to

**Intricate Die Work**

and to the manufacture of superior

**Japanned, Pieced and Stamped  
Tinware.**

and other Catalogue Goods, we offer for sale the appliances, and power, with power, the rooms now occupied by the following departments of our business:

**BRONZE AND BRASS STAMPING,  
BRONZE AND BRASS SPINNING,  
BRONZE AND BRASS POLISHING,  
BRONZE AND BRASS DIPPING AND  
LACQUERING,  
ELECTRO-PLATING (Weston Dynamo-  
Electric Machine).**

To a person of experience, with requisite capital, this is a rare opportunity to engage in a profitable business.

Apply at once, in person or by letter to  
**THE DETROIT STAMPING CO.,**  
Lafayette and Brush Streets, Detroit.

## Wanted.

**Light Machinery of all Kinds  
to Build.**

**Also Experimental, Jobbing  
and Repair Work.**

Would also contract for rolling from 100 to 500 tons special shapes or sizes of iron.

Correspondence solicited.

GLOBE NAIL CO.,

Boston, Mass.

**Metal  
Exchange Memberships**

Bought and Sold by  
**WM. WILLIS MERRILL,**  
4 Stone Street, Room 69.

Dealer in  
**EXCHANGE MEMBERSHIPS.**

## Wanted.

A Salesman for our Iron Department in San Francisco. A man thoroughly conversant with the iron business in all its branches, and also of steel, pipe tubes and heavy hardware. Apply by letter to  
**DUNHAM, CARRIGAN & CO.,** New York,  
Post Office Box 264.

giving particulars of age, experience and salary expected.

**TO CAPITALISTS.**—An active business man, who for past ten years has traveled over United States generally for Manufacturers of Iron Goods, is desirous of a position in some reliable house as Manager, Correspondent, or as Buyer for large incorporated company. Satisfactory references and all communications confidential.

Address "BOILER TUBES,"  
Office of The Iron Age, 81 Reade St., New York.

## Wanted.

A man of 20 years' experience as Manager of Coke and Raw Coal Furnaces desires a position. Has had experience with all native and foreign ores. Refers to F. D. Norton, Belfont Iron Works Co., Ironton, Ohio, and Col. Douglas Putnam, General Superintendent, Ashland, Ky.

Address THOS. L. HOUGHTON,  
Ashland, Ky.

## WANTED.

Position as Superintendent of Boiler Plant Mill by an energetic man with experience. Familiar with accounts and management of business. References given.

Address "NEWMARKET,"  
Office of The Iron Age, 220 S. 4th St., Phila., Pa.

## Special Notices.

## For Sale.

**SIX 75-H.-P.**

**BABCOCK & WILCOX  
BOILERS,**

**SECOND-HAND.**

Lately in operation at the Havemeyer Sugar Refinery, Greenpoint, N. Y. The above having been taken in part payment for 2000 H.P. of our latest pattern, will be sold cheap. Address

THE BABCOCK & WILCOX CO.,

30 Cortlandt Street, New York.

Oliver Street, Boston.

15 White Building, Syracuse, N. Y.

32 North Fifth Street, Philadelphia.

91 Fourth Avenue, Pittsburgh.

45 Chamber of Commerce, Baltimore.

48 South Canal Street, Chicago.

60 Carondelet St., New Orleans, La.

505 Mission Street, San Francisco.

50 San Ignacio, Havana.

Book on "Steam," to any address, free.

THE BABCOCK & WILCOX CO.,

New York. Glasgow.

## For Sale.

THE WHOLESALE AND RETAIL

**HARDWARE AND STOVE  
BUSINESS**

**F. J. HOGAN & CO.,**

Little Rock, Ark.

LONG ESTABLISHED. A CLEAN STOCK OF  
ABOUT \$50,000. SATISFACTORY  
REASONS FOR SELLING.

## For Sale.

1 Train, Lath's, 3-high rolls, 22-inch.  
1 Train, 2-high rolls, 22-inch.  
1 Train, 2-high soft rolls, 20-inch.  
1 Train, compound, 2-high muck rolls, 18-inch.  
1 Roll Turning Lathe.  
1 Large Engine, 22 in. x 30 in.  
1 Large Boiler, fire-box 28 ft. x 48 in. Good as new.

1 Medium Boiler, 24 ft. x 48 in.  
1 Large Squeezer, 1 Large Pump, 1 Plate Shear, 1 Sheet Shear, 1 Muck Shear, 2 Scrap Shears, Castings for four Charcoal Fires, Fans, Tools, Patterns, Scales, &c.

Will be sold together, or separate, very cheap. Easy terms to responsible parties.

Address H. W. W.,  
130 Dearborn St., Rooms 14 and 16,  
Chicago, Ill.

## Wanted.

Roll Lathe in working order, 9 ft. 6 in. between centers, and 20 in. swing; stands for 20 in. and 10 in. rolls. Address P. O. BOX 1158,  
Pittsburgh, Pa.

## Wanted.

A party to manufacture and take agency for a new Self-measuring Saw Table Gauge; all Lathe and Drill work. For particulars, address the patentee,  
**JOHN KIRK,**  
330 1/2 E. 6th St., Cincinnati, Ohio.

## Wanted.

Several good Die Sinkers and Drop Hammer men wanted at Works of Chicago Forging Co., Pullman, Ill. Steady work and good wages. Competent men only need apply to  
**THOMAS YORKE, Supt.,**  
Kensington P. O., Ill.

**SPECIAL NOTICE.**

IN PRINT AND READY FOR DISTRIBUTION IN 30 DAYS, A POCKET MANUAL FOR ENGINEERS, EDITED BY  
**JOHN W. HILL, Mechanical Engineer,**  
Member American Society of Civil Engineers;  
Member American Association R. R. M. M.

EDITION TEN THOUSAND.

Of which, first 2000 copies will be furnished, postage prepaid, at one dollar (\$1.00) each; subsequent copies will be furnished (postage prepaid) at one dollar and a half (\$1.50) each. A pocket manual of useful information for mechanical engineers, steam users and mechanics, containing 224 pages (set in non-parted type) of carefully selected data, formulae and experimental investigations from the latest and most approved sources. Printed from electrolytic plates, on white No. 1 book paper, in stiff morocco covers with cardinal edges. Size of page 4 1/2 x 6 1/2 inches. From press of Robert Clarke & Co., Cincinnati, O.

Published by WILLIAM A. HARRIS, Builder of Harria-Corliss Steam Engines, Providence, R. I., to whom all subscriptions for copies should be sent.

## Wanted.

To Sell or Let, a first-class Foundry, situated in the village of Green Island, N. Y., on the opposite side of Hudson River from Troy; within easy reach of Hudson River and Erie and Champlain Canals. Goods can be shipped as late as 5 p.m. and be in New York early next morning. To manufacturers of Hardware specialties it offers exceptionally fine advantages. Has a good engine and all necessary machinery in the building.

Correspondence solicited. Address  
**JAMES MORRISON,**  
Troy, N. Y.

**E. BISSELL & CO.,**

Wholesale Hardware Auctioneers,

83 Chambers and 63 Reade Sts., N. Y.

Sales held weekly for the trade. Consignments solicited. We refer to the leading manufacturers and importers.

**WANTED.**—Position as Traveler for some good Hardware or Specialty House, by a gentleman who has had a number of years' experience in the Hardware and Woodware trade, in the house and on the road. Best of reference given. Address "CLEVELAND,"  
Office of The Iron Age, 83 Reade St., New York.

## Special Notices.

## NEW AND SECOND-HAND

## MACHINERY.

1 Engine Lathe, 48 in. swing, 20 ft. bed. New.

1 " " " 48 in. swing, 16 ft. bed. New.

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Special Notices.

FIRST-CLASS PAYING BUSINESS  
For Sale.

Parties having built up and thoroughly established an extensive and fine paying business, will sell the same, including several fine machinery specialties in iron and wood, and a jobbing business of every class of Gearing, Shafting, &c., and Foundry and Woodwork. Specialties have but little competition and are easily managed. The jobbing business includes a very fine collection of patterns in constant use, and controlling a very large jobbing trade. Also Machinery, Tools, Stock, &c., and good will.

Above business is constantly growing, and has every year attracted very large amount of money. Is centrally located and upon a large and never-failing water power, with canal through premises and excellent railroad facilities. The reason for owners offering same is because the business has grown too large for present buildings and facilities and is constantly growing, and they desire to remove one specialty, for which they have lately secured letters patent and requiring special buildings and machinery, to the center of its market in the West, which will relieve sufficiently the present facilities now overcrowded. Or should any parties desire, we will sell the specialty and retain the other business.

The straightforwardness of above facts can be readily ascertained.

Any young man or old business men having money will find either business a very pleasant and profitable one. To save annoyance or trouble, we will answer inquiries only from parties with commercial standing or who are vouched for by bankers or other responsible parties. Would prefer parties with means, interested and looking for an established, paying business, to call personally upon us with proper letters and introductions.

E. W. ROSS & CO.,  
Fulton, N. Y.

To Brass Foundries.  
To Brass Manufacturers.

Our new foot press, for cutting off GATES from brass castings by FOCUT process, is now ready. Weight, 2 lbs. Price complete, \$30.00. A boy can operate it easily. We warrant them to give the most perfect satisfaction. FERRIS & CO.,  
10 W. 2nd Street, New York

For Sale or Lease.

A Large Two-Story Brick Factory,  
formerly Machine Works, at Pearl River, N. Y., on railroad depot, 25 miles from New York City. Railroad facilities unexceptionable, on the line of the New Jersey and New York Railroad. The property contains 40,000 square feet floor space, with one 80 H. P. Engine and Boiler, 200 ft. 4-inch line shafting and pulleys, main belts, steam heating and water pipes throughout the building. A splendid iron foundry, 70 ft. by 30 ft., with one iron smelting cupola, with Mackintosh blower, brass furnace, core oven, blacksmith shop, pattern vault, annealing oven, etc. The property can be bought or leased on liberal terms. For further particulars, price, terms, etc., address  
J. E. R. & Co.,  
111 Liberty St., New York City,  
or Pearl River, Rockland Co., N. Y.

For Sale.

The largest stock of New and Second-hand Engines, Boilers, and general Machinery in the West. Send for Catalogue. Hoisting Outfits for Coal Mining and other purposes a specialty.  
WARREN SPRINGER,  
105 to 219 South Canal St., Chicago.

For Sale.

Second-hand  
DROPS AND LIFTERS.  
BEECHER & PECK,  
Lock Box 222, New Haven, Conn.

For Sale.

New Machine Tools, &c.  
16 in. x 5 ft. Engine Lathe, with 6 in. chuck, \$800  
18 in. x 8 ft. Engine Lathe, power cross feed, 350  
20 in. x 10 ft. Engine Lathe, power cross feed, 475  
22 in. x 12 ft. Engine Lathe, power cross feed, 625  
24 in. x 14 ft. Engine Lathe, power cross feed, 750  
30 in. x 16 ft. Engine Lathe, power cross feed and compound rest, 850  
27 in. x 12 ft. x Planes 7/4 ft. Planer. A fine tool, 675  
30 in. x 16 ft. x Planes 10 ft. Planer. A fine tool, 750  
15 in. Circular Base Graduated Planer Chuck, 35  
18 in. Square Base Planer Chuck. Very heavy, 25  
20 in. Upright Drill, new design, 100  
Nut Tapper, capacity 12,000 1/4 in. nuts per day, 125  
Chapin Header for 1/4 in. to 1 1/2 in. Carriage Bolts, 350  
Punch Press and Shear, small size, 25  
Punch Press and Shear, large size, 40  
All the above tools are new and are warranted first-class in every respect.

For Sale.

A stock of Hardware, with a good business, in one of the best towns in Central Iowa. Will be sold cheap, with or without the building.  
Address, A. G. THOMPSON,  
Cedar Falls, Iowa.

For Sale.

A large number of Steam Pumps of all makes, and ranging in size from small tank or boiler feeds up to very heavy service machines.  
While the stock lasts good bargains are open for Miners, Water Works, Rolling Mills, Furnaces, or any one needing to move fluids by steam.  
Call upon or address  
J. D. A. HINCKLEY,  
Purchasing Agent of the United Pipe Lines,  
Oil City, Pa.

For Sale.

A well established Hardware Store and Tinware Business in Central Pennsylvania. Stock clean and in good shape. Will invoice about \$5000. Good reasons for selling. None need answer but those meaning business.  
Address  
110 N. Third street, Philadelphia, Pa.

For Sale.

To a competent Mechanical Engineer, with experience in managing Machine Shops, an interest in the Omaha Foundry & Machine Co., at Omaha, Neb. The largest and best equipped shops in Nebraska, with a splendid trade and no local competition. Address  
T. W. T. RICHARDS,  
Omaha, Neb.

For Sale.

A stock of Hardware, with a good business, in one of the best towns in Central Iowa. Will be sold cheap, with or without the building.  
Address, A. G. THOMPSON,  
Cedar Falls, Iowa.

For Sale.

A large number of Steam Pumps of all makes, and ranging in size from small tank or boiler feeds up to very heavy service machines.  
While the stock lasts good bargains are open for Miners, Water Works, Rolling Mills, Furnaces, or any one needing to move fluids by steam.  
Call upon or address  
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Purchasing Agent of the United Pipe Lines,  
Oil City, Pa.

For Sale.

A well established Hardware Store and Tinware Business in Central Pennsylvania. Stock clean and in good shape. Will invoice about \$5000. Good reasons for selling. None need answer but those meaning business.  
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Special Notices.

HENRY I. SNELL,  
135 North Third St., Philadelphia, Pa.,

has just received a fresh lot of Machine Tools, Engines, &c., which he offers at very low figures.  
One Screw-cutting Lathe, 6 ft. bed, 18 in. swing.  
One Screw-cutting Lathe, 8 ft. bed, 18 in. swing.  
One Iron Planer, made by Betts, 13 ft. long 38 in. wide.  
One Power Crank Planer, 12 in. stroke.  
One 11 in. Shaping Machine, traveling head.  
One 38 in. Upright Drill. Extra heavy. New.  
One 200 lb. Ferris & Miles Steam Hammer.  
One 40 H. P. Corliss Engine.  
One 26 in. Heavy Endless Bed Surfacers.  
One 60 H. P. Locomotive Boiler.  
One R. Ball & Co. Planer and Matcher.  
One Rogers Planer and Matcher.  
One J. A. Fay & Co. Planer and Matcher.  
One Smith 8-inch Moulding Machine.

For Sale.

Palo Alto Rolling Mills,  
Near Pottsville, Pa.,  
ON THE MAIN LINE OF THE POTTSVILLE  
AND READING RAILROAD.

These mills are in good repair, and can be started in two days' time.  
Rolls for T-Rails 12 to 20 lbs. per yard, and for Street Rails 12 to 20 lbs. per yard.  
Guide Mill Train for Merchant Iron 1/2 to 1 inch.  
Rolls for Merchant Bar, round and square, up to 4 1/2 inches.  
Number of Puddling Furnaces in both mills, 30; Heating Furnaces, 9; all with boiler attached.  
Also Foundry, Machine Shop, Blacksmith shops, Iron House, Roll House, Carpenter and Pattern Shops, Stables, handsome Dwelling for Superintendent, 11 Tenement Houses, a Brick Office, and ample grounds for stock and cluder.  
For further particulars address  
Messrs. LEE & McCAMANT, Extrs.,  
Pottsville, Pa.  
THOS. F. WRIGHT, 1809 Race St., Philadelphia, Pa.  
HUGH W. ADAMS, 56 Pine St., New York.

For Sale.

Bolt and Nut Machinery.  
9 Bolt Cutters, National, capacity up to 1 1/2 in.  
10 Bolt Cutters, National, capacity up to 1 3/4 in.  
6 Bolt Cutters, National, capacity up to 1 3/4 in.  
3 Bolt Cutters, National, capacity up to 2 in.  
3 Bolt Cutters, National, capacity up to 2 1/2 in.  
each, 3 in. and 4 in.  
2 National Bolt Headers, capacity up to 1 in.  
1 National Bolt Header, 1 1/2 in.  
1 Improved Lewis Bolt Header, capacity up to 1 1/2 in.  
Several Chapin Headers, light and heavy; Nut Tappers, a complete assortment; Cold Headers for Rivets, Store Bolts, &c.; Hot-pressed Nut Machines, 3 sizes; Washer Machinery, and every variety of tool used in Bolt and Nut shops. The only specialists in line in the United States.  
Address  
THE NATIONAL MACHINERY CO.,  
Tiffin, O.  
Catalogues sent free to any address.

For Sale.

ROLLING MILL PROPERTY  
For Sale at Low Figures.  
The Rolling Mill at Poughkeepsie, N. Y., with the entire plant and machinery, about 15 acres of land, large and valuable water front, with substantial wharf. One of the best locations in the country for manufacturing.  
Apply to  
W. S. JOHNSTON, Trustee,  
Poughkeepsie, N. Y.

For Sale.

No. 6 Steam Engine and Countershaft.  
5 Blake Steam Pump, good as new.  
Nos. 3, 4 and 5. Hydraulic Works Steam Pumps.  
Belt Pump for Hydraulic Press.  
Head & Sisco Centrifugal Pump, 4 in. discharge.  
Small steam Blowing Engine.  
A. G. BROOKS & WINEBURNER,  
261 N. 3d St., Philadelphia.

For Sale.

MACHINES FOR MAKING PICKS, MATTOCKS AND AXES.  
With Solid Punched or Adze Eyes.  
T. & CO., Box 25,  
Office of The Iron Age, 83 Read St., New York.

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Trade Report.

BRITISH IRON AND METAL  
MARKETS.

[Special Cable Dispatch to The Iron Age.]

LONDON, WEDNESDAY, JUNE 13, 1883.

Scotch Pig.—The market is weaker and prices have further declined. The following are to-day's prices for makers' brands.

Cottbus, alongside, Glasgow	60/6
Langloan, "	61/7
Gartbarrie, "	57/6
Summerlee, "	58/6
Carnbroe, "	54/6
Glenarnock, " Ardrossan	54/6
Eglinton, "	48/6
Dalmellington, "	48/6
Shotts, " at Leith	60/6

Lighterage from Ardrossan to Glasgow is 1/8 ton.

Cleveland Pig.—The market is a little steadier. We quote as follows, f.o.b. shipping ports:

Middlesboro' No. 1 Foundry	41/6
" No. 2 "	42/6
" No. 3 "	39/6 @ 40/
" No. 4 Forge	38/6

Bessemer Pig.—There is no change, the market continuing irregular. We quote W. C. Hematites 50/ @ 51/ for mixed lots Nos. 1, 2 and 3, equal parts, f.o.b. shipping ports.

Blooms.—Nominal.

Manufactured Iron.—The market is a little steadier. We quote at works, nominally:

Staff. Ord. Marked Bars	7 10 0 @ 7 10 0
" Medium "	6 10 0 @ 7 0 0
" Common "	6 5 0 @ 6 10 0
Hoops, 20 W. G. and over	
" Common Best	7 5 0 @ 7 15 0
" Medium "	6 10 0 @ 6 15 0
" Common "	6 5 0 @ 6 10 0

Sheets, 20 W. G. and under

" Ordinary Best	9 10 0 @ 10 10 0
" Common "	7 10 0 @ 8 0 0
Welsh Bars	5 10 0 @ 5 18 0

Steel Rails.—The market is firmer. We quote Ordinary Sections, £4. 15/ @ £5, f.o.b. shipping ports.

Iron Rails.—Dull and nominal. Welsh, 30 lb and upward, are quoted, nominally, £4. 15/ @ £5, f.o.b. shipping ports.

Old Rails.—The market is irregular. We quote Old D. H.'s, c.i.f. New York, £3. 12/6 @ £3. 15/.

Scrap.—The market is a little firmer. We quote Heavy Wrought £3. 2/6 @ £3. 5/ c.i.f. New York.\* We are reported a sale of Wrought Scrap for prompt shipment to the United States at 57/ f.o.b. shipping ports.

Bessemer Cup Ends are quoted 60/ @ 62/ f.o.b. shipping ports, for run of the mill.

Copper.—Is steadier. Best Selected is quoted £69 @ £70, and Chili Bars, 63/ @ £64 5/.

Tin.—The market is irregular. We quote Straits Ingot, spot, £93. 15/ @ 94. 5/, and futures, £94. 10/ @ 95. 5/.

Tin Plates.—The market is steadier. We quote:

Tin Plates, 10 x 14, 1st qual. Charcoal	19/6 @ 20/6
" " " "	18/6 @ 19/6
" " " Coke	17/6 @ 18/6
" " " "	16/6 @ 17/6

Spelter.—Is firmer. Ordinary is quoted £15 @ £15 5/ at shipping ports.

Lead.—Is weak. We quote Common English Pig £12. 15/ @ £13.

Freights.—Steam from Glasgow to New York, 7/6; Liverpool to New York, 6/ @ 8/; Liverpool to Philadelphia, 7/6 @ 8/; and London to New York, 7/6 @ 9/6.

FINANCIAL.

Office of THE IRON AGE,  
WEDNESDAY EVENING, JUNE 13, 1883.

In a survey of the several departments of business and finance, few positive indications of improvement are noticed within the past week. Nevertheless, the general tone is more confident and hopeful. Fine weather throughout the agricultural region has a cheering effect, and the favorable exhibit of railroad earnings shows that a very fair distribution of merchandise is in progress. The only real ground of complaint is found in the meager profits of business, which could hardly be otherwise, after several months of gradually shrinking values. That a comparative state of inaction should exist pending the changes of tariff to take effect July 1st is but natural, and quiet in trade circles is the usual expected accompaniment of the warm season. In the money market there are no symptoms to excite disquietude, capitalists and institutions alike being pletoric with loanable funds, while the associated banks are strongly fortified in their resources. The supply of cash in hand is \$7,500,000 greater than one year ago, and the line of deposits is some \$14,000,000 in excess, while the aggregate of loans is but slightly increased. On the other hand, the present condition of the export market is not altogether propitious, the outward movement of grain being checked by speculative causes, so that, as lately noticed by a leading banker, not a single bushel of this class of freight was in course of shipment, as against 130 vessels in port loading with cereals one year ago, and this notwithstanding there remains in the country of the crop of 1882 more than double the quantity as compared with the corresponding period of last year. At the present writing, foreign markets give further evidence of weakness, while wheat-exporting countries other than our own are taking advantage of the comparatively high prices ruling here by marketing their grain. Among dry-goods merchants, buyers are less

forward than one year ago, the policy of contraction that has been so marked a feature during the past season being still in favor. It is just now a grave question whether the shutting down of the woolen mills will become general enough to afford the desired relief. In breadstuffs and provisions alike the market is depressed and trade light. Business failures throughout the country continue numerically about as for some time past, and more than in the corresponding weeks of the last two years. Accounts per mail respecting interior trade, particularly in Western cities, show that business is fairly active.

On the Stock Exchange during the week under review the market has shown more buoyancy than before for a long time, attributable to good harvest prospects, liberal railway earnings, the improved condition of the London market, and more favorable accounts respecting general trade outside of the iron interests. The coal stocks were at first unusually active, but a bear movement followed a denial of the reported coal combination, to which were added rumors of trouble between the trunk line railways. The market was further unsettled by the announcement, on Monday, that a firm of brokers had suspended. On Tuesday the course of speculation was again in favor of higher prices. Central New Jersey, Louisville and Nashville and the Western Union were all strong and active, the latter on reports that suits commenced against the company had been discontinued. The bulk of the business, however, was confined to room trading. To-day the market gathered strength from the time of opening, and became buoyant at the close, partly due to the good financial statement from Western Union. The most active stocks were: Lake Shore, 3/4 to 1 1/4; Louisville and Nashville, 3/4 to 5 1/4; Western Union, 1/2 to 88; Michigan Central, 1/2 to 98 1/4; N. Y. Central



the Yale Co. say, "was abandoned nearly two years ago." Why do they advertise it for sale, then?

They say further: "Our Yale Caster" is made under patents of Oct. 9, 1877. This is important, if true. But upon turning to the *Patent Office Gazette* we find that but two patents were issued for furniture Casters, Oct. 9, 1877, and both are single-wheeled Casters, or, rather, one is a single-wheeled Caster and the other is a single-ball Caster. If the Yale Caster Co. make Casters with single wheels, or socket balls, they may do so to their heart's content, but we propose to protect ourselves against any infringements of our rights.

Messrs. Schenck & Co. and their New Haven allies have had a fair chance and full notice to defend their customers in two suits and they failed to make such defense, and it won't do for them to commence to make faces in the papers over the legitimate results of their own negligence or cowardice.

And here we stop, remarking that any further controversy with Schenck & Co. or the Yale Caster Co. will be in a different forum, and one where they have already twice declined to meet us, viz., the United States Courts. Yours respectfully,  
THE PHENIX CASTER CO.

## IRON.

**American Pig.**—During the week since our last there have certainly been larger sales than during any equal period for a long time past. There is a good deal of inquiry from consumers, a majority of whom feel willing to forestall their season's requirements at present prices. These are indeed so low as to be below cost to a very large proportion of furnaces, many of which find it to their interest to blow out. It is reported that on the Lehigh, Schuylkill and Susquehanna 62 furnaces out of a total of 140 are out of blast. These furnaces will probably average a capacity of 250 tons a week each. The Thomas Iron Co. report sales during the week for season delivery aggregating about 8000 tons, at \$20 and \$19 for Nos. 1 and 2 Foundry, respectively. They are still confining their sales to those whom they consider their regular customers. We quote Foundry No. 1, \$20 @ \$21; Foundry No. 2, \$18 @ \$19.50; Gray Forge, \$17.50 @ \$19 at tidewater.

**Scotch Pig.**—The low price of American Pig has naturally the effect of lessening the demand for Scotch, but arrivals are taken up about as fast as received. Prices are practically unchanged, as any decline in the Glasgow market has been fully made up by an advance in freights. We quote: Eglinton, \$21.25 from ship, \$22 from yard; Carnbroe, \$23 from ship; Glengarnock, \$22.50 @ \$23 from ship and yard; Dalmellington, \$21.50 @ \$22 from ship; Summerlee, \$24 from ship; Coltness, \$24.50 @ \$24.75 from ship; Gartsherrie, \$25 from yard; Langloan, \$24.50 from ship.

**Steel Rails.**—No important transactions are reported; indeed, the mills are so well supplied with orders as to be reluctant to make further engagements; \$38 at mill remains the usual price.

**Old Rails.**—The market continues depressed and without animation. We quote, nominally, \$22 for Ts.

**Bar Iron.**—The volume of business doing in Bar Iron continues to be small and in meager quantities. Consumers have little confidence in the present condition of the market, and do not anticipate their wants. Manufacturers are anxious to sell, and are offering to discount to-day's quotations for orders to be delivered before the 1st of July, which keeps prices very weak and unsettled. Dealers are looking forward to the suspension of some of the mills for repairs, and the usual curtailing of the production during the next two months on account of the heat, as a reason for expecting a stronger market in the course of a few weeks. We continue to quote Refined Iron from the mills at \$2 @ \$2.25, from store at \$2.30 @ \$2.40, and Common at \$2.10 @ \$2.20.

**Scrap Iron.**—We are unable to report anything new in this line of trade. Business continues dull and prices nominal, which we quote as follows: Selected Yard Scrap at \$25 @ \$26, ex-store at \$24.50 and ex-ship at \$23. We note the sale of 750 tons ex-ship at \$23.50, and 250 tons on private terms.

## METALS.

**Copper.**—During the week under review the Lake companies sold 20,000,000 lb. at 15¢ for export and to manufacturers, deliverable to the end of the year. Since then the market is quiet at 15¢ @ 15½¢ for Lake, and 14¢ @ 15¢ for other brands. London was unchanged yesterday. To-day we are cabled from there to the following effect: "Copper is steadier. Best Selected, £69 @ £70, and Chili Bars, £63. 15/ @ £64. 5/." Messrs. James Lewis & Son, Liverpool, June 1, write: "We are now receiving large quantities of Argentinian Copper Ores and Matte from Montana. Of the former we recently completed a contract for about 6000 tons, delivery to be spread over 12 months, and are now in treaty for a further 2000 to 3000 tons. We have also made large sales of Matte from Montana. Last week we sold 280 tons for immediate shipment from New York at a very full price. The course of the Copper market now depends almost entirely upon the supplies we may receive from the United States. The recent advance in the price of Ingot Copper, chiefly caused by the strong speculation for a rise, in the course of which all the spot Bars offering at current rates have been bought up, is apparently being counteracted by sales for forward delivery."

CHILEAN EXPORT TO MAY 27.

1879.	1880.	1881.	1882.	1883.
Tons.	Tons.	Tons.	Tons.	Tons.
24,380	24,577	27,410	19,357	18,876

VISIBILITY.—ENGLAND AND FRANCE, JUNE 1.

1883.	1882.	1881.
Tons.	Tons.	Tons.
48,519	48,619	61,746

SPANISH EXPORT.—FIRST QUARTER.

1883.	1882.	1881.
Tons.	Tons.	Tons.
107,113	147,078	148,059
6,364	6,130	5,954

Manufactures may be quoted as under: Bottoms, 24¢; Braziers, 24¢; Sheathing, 22¢, and Bolt Copper, 24¢. These rates, we presume, may still be shaded.

**Tin.**—London giving way to £4 with Straits Tin, there has been more disposition to sell here, but as the demand is not very active, a higher price for Straits on the spot than 21½¢ cannot be obtained for large lots; in a jobbing way it brings 21½¢. L and F may be quoted 21½¢. From London we are cabled this afternoon as under: "The market is irregular. Straits Indot, spot, £93. 15/ @ £94. 5/, and futures, £94. 10/ @ £95. 5/." Messrs. James Lewis & Son, Liverpool, June 1, say: "Tin has varied in value between £96. 15/ and £94. 15/ during May, closing at £95. 10/ for Straits and Australian. Tin Plates.—Buyers generally hold off for the moment; a good trade is anticipated for July, but prices for delivery then do not show the duty reduction of 11¢ 3/4 box. We quote on a steady market, large lines, ordinary brands, 7 box: Charcoal Bright, \$5.75 @ \$6.25; do. Ternes, \$5.12½ @ \$5.25, and do. Ternes, \$4.87½ @ \$5. Liverpool was yesterday very steady; Coke at 16/ and Charcoal at 18/6 @ 20/7. We are told from London per cable to-day that the market is steadier."

**Lead.**—Sales have been effected during the week of 300 tons Aurora Corroding at \$4.42½, and 300 tons Common at the same figure. The actual price for both is \$4.40 @ \$4.50. Consumers, though well stocked for the present, are quite willing to buy for July, August and September delivery, but holders do not seem inclined to meet their views as to prices; hence little transpires. There is every chance of the price not varying much for some six weeks to come; this, at least, seems to be the general impression. In St. Louis, meanwhile, quite a business has been transacted at \$4.15 @ \$4.20, at which 700 to 800 tons Corroding sold; Common commands there as much. Freight from East St. Louis, 30¢. From London we are wired as follows to-day: "Lead is weak; Common English Pig, £12. 15/ @ £13. Messrs. James Lewis & Son, Liverpool, June 1, say: "We quote, £12. 17/6 @ £13 for English, and £12. 12/6 for ton for Spanish."

**Spanish Export.—FIRST QUARTER.**

1883.	1882.	1881.
Tons.	Tons.	Tons.
107,113	147,078	148,059
6,364	6,130	5,954

Manufactures are quoted as follows: Lead Pipe, 6¼¢; Sheet Lead, 7½¢; Tin-lined Lead Pipe, 15¢ 3/4 lb., and Block-tin Pipe, 45¢, less the usual discount to dealers.

**Spelter and Zinc.**—The same dragging sort of a state of affairs heretofore noted has prevailed, some Common Domestic Spelter offering very low. We quote the market \$1.60 @ \$4.70 for Common Domestic, and Slesian, 5 @ 5½¢; Bertha Refined, 7¼ @ 8¢, and Bergenport, 9½¢.

SPANISH CALAMINE EXPORT.—FIRST QUARTER.

1883.	1882.	1881.
Tons.	Tons.	Tons.
2091	8616	4102

From London we receive this afternoon the ensuing cablegram: "Spelter firmer. Ordinary, £15 @ £15.5/ at shipping ports." Sheet Zinc is quiet at 6½¢.

**Antimony.**—Has remained quiet; Cookson at \$10.70, and Hallett at \$9.70. Messrs. James Lewis & Son, Liverpool, June 1, say: "We quote French Star Regulus, £39 @ £40 3/4 ton."

FOREIGN TRADE MOVEMENTS.

The following is a summary of foreign trade movements during the past week:

For the week ended June 8:

1883.	1882.	1881.
Total.	\$9,177,558	\$7,718,112
Prev. reported.	\$11,846,595	\$9,188,377
Since Jan. 1.	\$39,174,147	\$27,504,495
	\$20,624,719	\$20,624,719

Included in the imports were leading articles of merchandise valued as follows:

Pkgs.	Value.
Brass goods.	\$3,516
Bismuth.	448
Bronzes.	20
Clocks.	1,844
Chains and anchors.	1,800
Copper.	163
Cutlery.	36,337
Guns.	34
Hardware.	7,107
Iron, pig, tons.	2,628
Iron, sheet, tons.	4,224
Iron ore, tons.	926
Iron, other, tons.	40
Machinery.	178
Metal goods.	7,914
Nails.	12,558
Needles.	4,734
Nickel.	8
Old metal.	3,540
Plated ware.	4
Per. caps.	3,910
Pins.	1
Plumbago.	3,639
Saddlery.	14
Spelter.	116,923
Spelter ore.	339,354
Silver ore.	1
Silverware.	1,824
Tin, bxs.	37,690
Tin, 3.55 lbs, 347,026 lbs.	8,251
Wire.	15,058

The quantity of hardware and metals imported compares with previous dates as follows:

For the 21 weeks	Same
week.	time 1882.
Cutlery, pkgs.	87 3,150
Hardware, pkgs.	7 649
Iron, R. R. bars.	3,847 70,441
Lead, pigs.	3 15,544
Steel, pkgs.	116,923 1,746,535
Tin, bxs.	37,690 812,584
Tin, 3.55 lbs.	347,026 9,583,633

EXPORTS OF SPECIES.

For the week ended June 9:	1883.	1882.	1881.
Total.	\$60,823	\$61,011	\$61,011
Previously reported.	\$6,010,834	\$6,010,834	\$6,010,834
Same time in 1882.	\$6,010,834	\$6,010,834	\$6,010,834
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EXPORTS OF SPECIES.

rel. ....	8	2,836
metal. ....	..	1,540
ed ware. ....	4	212
caps. ....	90	3,031



At Glasgow warrants have been very quiet and have relapsed in value, some of the brands of Scotch pig having also given way. Another furnace has been blown in at Monkland, as a means of increasing the already large make. At Middlesbrough all prices are weaker, sales of No. 3 being noted at 39/6, and even at 39/, although it is understood that the latter price was for a small lot from second hands. On the West Coast the story is the same—a depressed market, a limited amount of new business, and nominal values. Everywhere pig iron is low and neglected. The furnaces are making more iron than is being sold, and the larger stocks grow, so much the weaker are quotations. From Birmingham a circular, by an anonymous author, has been issued, calling attention to this fact and strongly advising a general restriction of the output, but the appeal is certain to fall flat, simply because nobody is willing to immolate himself for the benefit of his neighbor. In heavy manufactured iron there is nothing specially new to report. Most of the larger works are well engaged on ship-plates, boiler plates, &c., but forward prices are not adamant, and the period beyond midsummer bids fair to be quiet. In merchant iron there is literally nothing to note. Marked bars remain at 77/10, and other sorts as per your current telegram. Old rails are nominal at 67/6, but cash, f.o.b. London, with 7/6 freight to New York, while heavy wrought scrap is a little more inquired after at 27/6 to 28/3.









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Steel is Fast Taking the Place of Iron in all Mechanical Tools.

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Forged Horse Nails.

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NORWAY IRON AND WARRANTED.

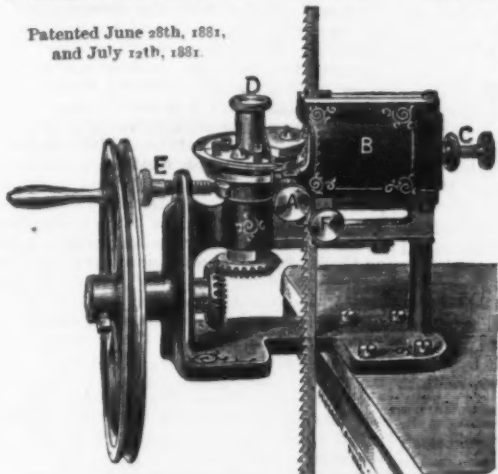
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DURRIE & McCARTY, Sole Agents.

## AMESBURY'S BAND SAW FILING MACHINE

Patented June 28th, 1881,  
and July 12th, 1882.



Will Save Its Cost in a Few Weeks.

Any boy that can turn a crank can file a band saw in from five to ten minutes more accurately than an expert filer can do the same by hand in one hour. Keeps the teeth even and level, and enables the saw to do more and better work with much less strain. Pronounced by users to be the best labor-saving machine ever introduced.

First Premium and Diploma of  
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Mechanical Association,  
1881. Awarded for

Best Band Saw Filing Machine.

Is sold at a price within the reach of every one using a band saw. Reduced Price List.—Net price, including 20 files, \$30; thin corner and facing files, per dozen, \$1.20; thick beveled files, per dozen, \$1.80. Terms strictly cash. Send for Catalogue and Testimonials.

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## NORTH BROTHERS,

23d & Race Sts., PHILADELPHIA, PA.,

HARDWARE MANUFACTURERS,

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For Molasses, Oil, Japan, Varnish, &c.

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(Variety Iron Works.)

Manufacturers of  
HARDWARE SPECIALTIES, IRON TOYS, NOVELTIES  
AND HOUSE FURNISHING HARDWARE.

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BRANCH OFFICE:

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CLARK & COWLES.

ALL KINDS OF RIVETS.

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## A. E. DEITZ,

(Successor to Barnes & Deitz.)



DURRIE & McCARTY, Agents,  
97 Chambers & 81 Reade Sts., New York.

## SOUND

## DEADENED

IN FLOORS AND WALLS OF

FACTORIES,

STORES,

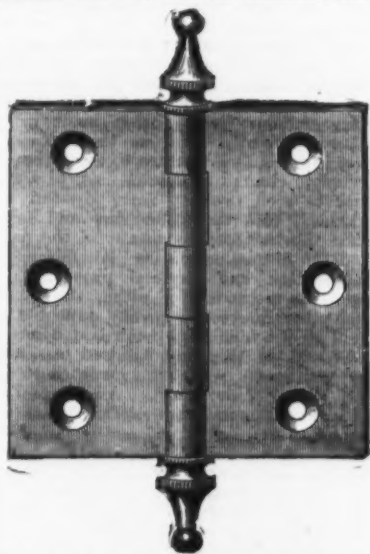
AND DWELLINGS,

By the Fire-Proof Material,  
Called Mineral Wool.

The POOREST CONDUCTOR of heat  
yet offered. CHEAP and DURABLE.  
Sample and circular free by mail.

## U. S. MINERAL WOOL CO.,

22 Cortlandt St., New York.



## CAST BRASS BUTT HINGES,

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W. & J. TIEBOUT,

Manufacturers of

BRASS, GALVANIZED & SHIP CHANDLERY

HARDWARE,

Nos. 16 & 18 Chambers St.,

NEW YORK.

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STEEL RULES, &c.

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WM. H. BELCHER,

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New York Stock Exchange.

## TINIUS OLSEN & CO., STANDARD SCALES

AND

## Testing Machines.

Manufacturers of all descriptions of Testing  
Machines. Tests made daily.

Office and Works, N. W. cor. 19th and  
Buttonwood Sts., Philadelphia.

## L. COES'

Genuine and Mechanics

PATENT

## Screw Wrenches

MANUFACTURED BY

L. COES & CO.,

Worcester, Mass.

ESTABLISHED IN 1839.



Our Genuine Wrenches are made with  
straight bars, full width and enlarged jaw, hav-  
ing ribs cast inside, which strengthen the jaw  
and give a full bearing on front of bar. These  
improvements, in combination with our new  
ferrule, made with double bearings, an iron  
tube, fitted to the shank and resting against  
the lower bearings, rigidly held in position by  
the handle and nut, effectually preventing back  
thrust of ferrule (see sectional view), verify  
our claim that we manufacture the heaviest  
and strongest Wrench in the market. None  
genuine unless stamped

L. COES & CO.,

Worcester, Mass.

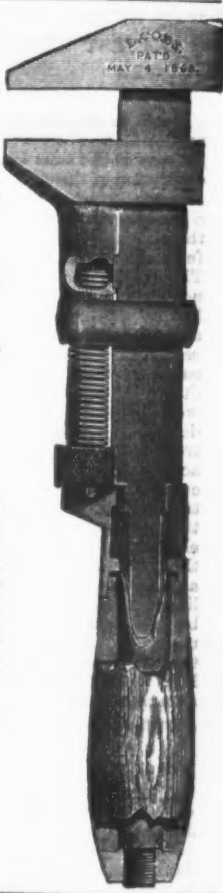
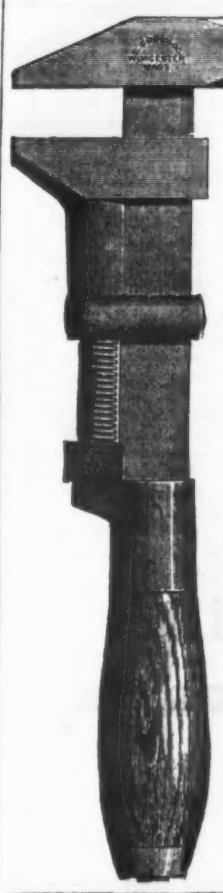
Warehouse,

97 Chambers and 81 Reade Sts.

NEW YORK.

DURRIE & McCARTY,

Sole Agents.



1883.

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## LAWN MOWER.

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passing all others, and  
pronounced  
"THE BEST."



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R. A. CULTER & CO., Peoria, Ill.

BUCHARME, FLETCHER & CO., Detroit, Mich.

LOCKWOOD, VANDORNO & TAYLOR, Cleveland,

WM. FRANKFURTH & CO., Milwaukee, Wis.

WALTER S. LUDLOW, Cincinnati, Ohio.

LLOYD & CLARKE, La Crosse, Wis.

H. MITHOFF & CO., Columbus, Ohio.

BURROUGH BROS., Kansas City, Mo.

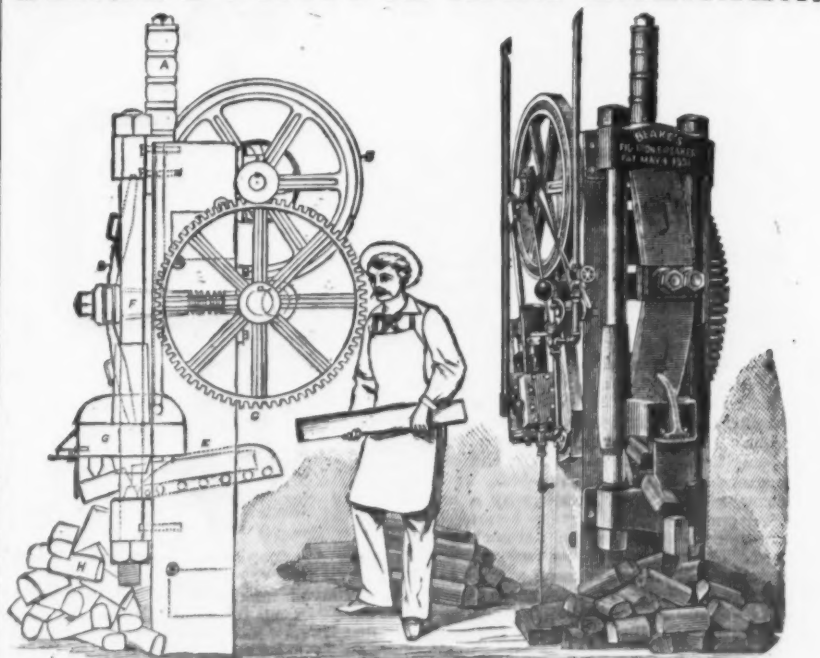
THE TODD-DONIGAN IRON CO., Louisville, Ky.

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## BLAKE'S PAT. PIG IRON BREAKER.



A new and successful machine for breaking pig iron into any length desired, with rapidity and  
economy. Besides saving in cost of breaking by hand, it secures the greatest economy in melting.  
Several machines already in use. Every machine guaranteed against breakage of parts. Requires  
but three horse-power. Can be run by belt or have small engine attached.

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## BLAKE CRUSHER COMPANY,

Sole Makers, 85 Orange Street NEW HAVEN, CONN.

## LOVEJOY & DRAKE,

Manufacturers' Agents,

101 READE STREET, NEW YORK.

## Iron Chain, Heavy Wagon Hardware

RAILROAD & BUILDERS' SUPPLIES, &c.

## ARTESIAN WELL MACHINES.

For our Full Page Advertisement, See First Issue of Each Month.



## LATEST LEGAL DECISIONS.

## SALE—FRAUD—CREDIT.

S sold to D certain goods on credit on the representation by D that he was solvent. He was at the time insolvent, and before the expiration of the credit made an assignment. At once, on learning of the insolvency of D, S sued for the value of the goods, and, after the assignment, the assignee came in to defend against the attachment S had secured. The ground of defense was that there was no cause of action yet accrued, as the credit had not expired. In this suit S was beaten and an appeal was taken—Dietz's assignee vs. Suttill—to the Court of Appeals of Kentucky, when the judgment was reversed. Judge Pryor, in the opinion, said: "It is well settled that when the vendor has been defrauded by his vendee, he may elect to treat the contract as a nullity and bring his action for the recovery of the specified property, or for its value, and this doctrine proceeds upon the idea that the contract of sale having been rescinded at the election of the vendor, he is still vested with the title, and the vendor may wave the tort and sue for the value of the goods. The reliance of the assignee, that the action cannot be maintained because the debt is not due under the credit, is avoided by the proof that the credit was got by fraud, which nullifies it, and, therefore, there is no obstacle to an action for goods sold and delivered."

## AGENCY TO TAKE ORDERS—RIGHT TO COLLECT.

B bought goods of J through "a commercial traveler," and when the bill for them was received payable to the traveling agent, J demanded payment. On being refused, he brought suit and was beaten. In this suit—Janney vs. Boyd—the defendant was allowed to prove by the agent "that payments are received by commercial travelers," for the purpose of establishing a usage to bind the plaintiff, and the plaintiff appealed, on that ground, to the Supreme Court of Minnesota, when the judgment was reversed. Judge Berry, in the opinion, said: "1. A usage to be binding, simply as such, must be established, general and uniform, as applicable to the particular business with reference to which it is sought to be set up. It must be the mode in which persons in that line do their business, so that the law will presume knowledge of it. 2. Independent of controlling usage to the contrary, the sale of goods by an agent, or the fact that he is or acts as agent to take orders for goods, does not of itself authorize him to receive payment therefor."

## CHattel MORTGAGE—ATTACHMENT.

In *Burnham vs. Doolittle*, the Supreme Court of Nebraska had under consideration the question whether the judgment debtor's equity of redemption or interest in goods under a chattel mortgage could be reached by attachment or garnishment. The Chief Justice, Lake, in deciding in the affirmative, said: "We are satisfied that whatever interest a mortgagee of chattels may have in them in this State may be reached by seizure under a writ of attachment at any time when in his possession, and by process of garnishment after they have passed into the hands of the mortgagee."

## CONTINUING GUARANTY.

In an action upon this guaranty: "OMAHA, Neb., March 11, 1878.—DEAR SIR: Please let Mr. J. N. have credit for goods to the amount of \$100, and for the payment of which I hold myself responsible," the vendor claimed that it was a continuing guaranty. Under this goods were sold to N. for two years, until he died. N. had made payments, but at his death he owed much more than \$100. The plaintiff was defeated in the action, and carried the case, in error—*Tootle vs. Elgatter*—to the Supreme Court of Nebraska, where he had a decision in his favor. Judge Maxwell, in the opinion, said: "The words employed in the instrument are the words of the defendant, and must be construed as strongly against him as their sense will allow. In our opinion, the guaranty in this case was a continuing one, and the limitation therein was as to the extent of the defendant's liability, and not as to the credit to be given to N."

## EXEMPT PROPERTY—CHattel MORTGAGES.

Chattel mortgages are held to be invalid for want of immediate possession of the goods, and the court directed the property to be sold, refusing to allow any exemption. This case—*Waite vs. Mathews*—was carried to the Supreme Court of Michigan, where the judgment was reversed. Judge Campbell, in the opinion, said: "1. Creditors have no rights against exempt property, and the officer levying is bound to respect it in the case of arteners as well as in other cases. 2. There seems to be no good reason why a chattel mortgage which is otherwise honest should not become operative on delivery of the goods, and take effect from such delivery. If a party could make a new mortgage and immediate delivery which would be valid, no good reason is manifest why one already signed, but needing delivery of the property to complete it, should not be made complete by said delivery, where no one has obtained rights or been prejudiced by the delay."

## REPLEVIN BOND—CREDITORS SUING TOGETHER.

Executions in favor of five creditors were placed in the hands of a sheriff at one time, and the levy being made, the judgment debtor replevied the goods. In the replevin suit the sheriff succeeded, and the creditors brought one joint suit on the replevin bond. In this case—*Kaufman vs. Wessels*—the defendants insisted that the creditors could not sue together, but they were beaten. They appealed to the Supreme Court of Nebraska, where the judgment was affirmed. Judge Maxwell, in the opinion, said: "We have no doubt that the creditors could join in the action, the judgment being a common fund out of which the executors are to be paid rata."

In the suit of John D. Boyle, of Pittsburgh, against the Wheeling Iron and Nail Co., to recover \$8770.08 for alleged violation of a coke contract, the defendants filed a plea that they are a West Virginia corporation, and not within the jurisdiction of the Pittsburgh court.

## Compound Hand-Vise.

Our illustrations represent a form of compound parallel hand-vise which has a very unusual gripping power without complicated mechanism, and at the same time works with parallel jaws. Two similar jaws are made with pins passing through near the top and bottom. Each pair of pins is drilled and tapped to receive a right and a left hand screw. By turning the upper screw in one direction or the other the jaws are made to open and shut. The lower screw, of course, acts on the lower end of the vise in the same manner. Turning the top of the upper screw from one causes the jaws to approach, and turning the top of the lower screw in the same direction produces the same effect on the jaw by separating the vise at the bottom. In this the jaws are closed by the upper screw as firmly as possible by the thumb and finger. The final grip is then given by turning the screw at the bottom, the vise working in this respect precisely like the hand clamp of the carpenter. The amount of power obtained by means of the thumb and finger appears to be out of all proportion to the strain exerted, and the grip of the tool

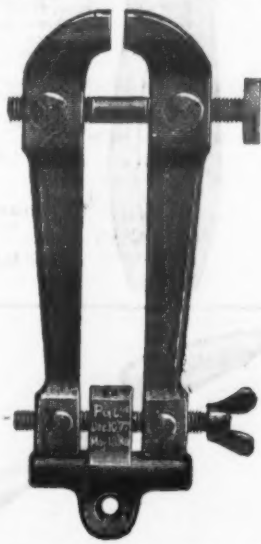


Fig. 1.—Compound Power Hand-Vise.

is really astonishing. At the bottom the two parts of the vise are connected by a T-shaped piece having a slot into which the ends pass. This slot is not shown in the engraving. The nuts being in the form of pins, of course enables the screw to work parallel at any angle without binding. The capacity is unusually large, the 6-inch vise jaws opening nearly 11-16ths of an inch, and having as firm a grip at the full opening as when nearly closed. To illustrate the grip of the vise we screwed it on to a vertical plate of iron 1/2-inch thick and set it up nearly with the force of the thumb and fingers. A weight of 125 pounds at the outer end of the vise was barely sufficient to cause the jaws to slip. This is certainly a greater gripping force than any hand-vise with which we are acquainted. Some of the chief claims for points of superiority in this tool are the small quantity of material, the symmetry, facility of operation, the parallelism of the jaws and the enormous power.

A very neat application of this tool has been made to carpenters' vises, hand drills &c., and is shown in Fig. 2. The bottom or back of the vise is prolonged and secured to an ordinary brace handle, and the jaws are held by the T-shaped projection, which is



Fig. 2.—Compound Power Brace-Wrench.

prolonged nearly to the lower end of the vise. In this form it will take in bit, broken tool, round, flat, square or three-cornered, and hold it firmly. This size has a range from the smallest up to 1 1/2-inch nut or bolt, and we should judge, would be an exceedingly convenient and handy tool. Both this form and the hand-vise are made entirely of steel, and the manufacture is carried on in such a way that the parts are all interchangeable, and when broken can be replaced without difficulty. The makers are Cook & McLane, 81 Center Street, New York.

A discovery which has just been made at Aleppo is likely to cause considerable surprise in military circles, for, according to the Turkish official gazette of that place, a party of engineers, while making excavations beneath the citadel of the town, have come upon a large wrought-iron breech-loading cannon which must have been buried for at least 250 years. That the weapon should be a breech-loader is in itself sufficiently astonishing; but the most extraordinary part of the affair is that the breech mechanism is almost exactly similar to that which has for so many years been fitted by Krupp, of Essen, to the artillery of the German army. The gun bears the name of its maker, Halebli Mustapha Osin, and is in fairly good preservation.

## Steel Castings in Ship and Marine Engine Construction.\*

The object of this paper is to direct the attention of marine engineers and shipbuilders generally to the progress that is being made in the introduction of reliable mild steel castings; to elicit information from the various eminent steel makers present respecting the character of the material they are able to produce, and the extent to which they feel it may safely and confidently be used in place of forgings, and to indicate as far as possible the qualities that steel castings should possess to fit them for replacing the principal forgings now used in marine work. Any facts which may be adduced to show that structures now made of large masses of metal worked into shape by the tedious and comparatively unreliable method of piling up and welding together pieces of scrap iron or steel may be made as reliable, if not more so, as cast steel, will have an important effect upon the action of many who, from the want of accurate knowledge, are unable to decide as to the advisability of adopting steel castings in place of forgings, and cannot fail to greatly facilitate progress in this direction. It is well known by those who have the management of steamships, and the responsibility of keeping them in efficient working order, that large forged stern frames and rudder frames, as now made, are seldom absolutely sound. Numbers of cases of these forgings having failed when put to work come under our notice, and afford sufficient evidence of the necessity of some improvement being made, while the mortality of wrought-iron crankshafts belonging to the mercantile marine of this country is excessive. Now, if these parts of steamships and marine engines can be cast sound, solid, thoroughly homogeneous and free from internal strain, and at the same time possessing the requisite strength and ductility, it will be a great advantage for engineers and shipbuilders, and eventually also for shipowners, to adopt this material for these purposes. At present, however, the subject of solid steel castings of these forms is somewhat in its infancy, and it is but natural that much doubt and suspicion should be found to exist in the minds of many who for the first time approach the question, just as some four or five years ago great distrust was manifested in many quarters as to the reliability and suitability of mild steel for plates, angles and rivets for shipbuilding and marine boiler making.

The hesitation in adopting the new material was doubtless strengthened by the many cases of mysterious fractures, and the instances of excessive corrosion brought forward to show the unwisdom of changing from iron to steel, but these doubts no longer exist, and the superiority of mild steel over iron for the principal structural parts of a ship is now freely acknowledged. In proof of this I may mention that last year there were no less than 73 large steamships built of steel, with a tonnage of about 143,000; that 116 vessels, with a total tonnage of 216,784, were building of steel in January last, and that at the present time there are more than six times as many marine boilers being made in this country of mild steel as there are being made of iron. I venture to think that this complete change of opinion has, to a great extent, been brought about by the facts adduced, and the knowledge and experience disseminated by means of the papers and the discussions on the manufacture, the composition and physical properties, the uses, the methods of working, the failures, and other interesting points connected with mild steel which have been laid before the members of this and kindred institutions by gentlemen who have made these various points their study. And I feel that similar discussions cannot fail to enlighten us upon the subject of the capabilities of mild steel castings. During the past 12 months several applications have been made by various firms to the society which I have the honor of serving, for their approval of the use, in vessels classed by Lloyd's Register, of steel castings for such purposes as stems, stern frames, rudders, tiller quadrants and other parts of vessels, and also for crank-shafts, levers, link blocks, and other portions of marine engines, those parts having usually been made of wrought iron. Before coming to any decision on the matter, the Committee of Lloyd's Register decided to fully investigate, first, the physical properties of the material intended to be used, such as its strength to resist various kinds of strains, its ductility, the homogeneity and soundness of casting of such forms as were desired to be used, and also as to whether the processes by which these castings were made and the raw materials employed were such as would be reasonably expected to secure certainty as to the results obtained; and, finally, to consider what tests it would be practicable to use to determine the quality of the material after the castings have been made.

With this object in view, visits were made to the three firms in this country who proposed making these large steel castings, and the views of those gentlemen were elicited who have had practical experience with these castings, as well as those who have been actively engaged in heavy forgings for shafting and complicated parts of machinery. Subsequently, also, visits were made to the works of, and consultations held with, the principal steel makers in France, a country where, up to the present time, much greater attention has been bestowed upon such matters than in our own. Tests were also made, not only upon samples of the material cut out of castings, but also upon castings themselves, and similar tests were conducted upon samples of forged iron and forged steel. The result is that the Committee of Lloyd's Register are now convinced that structures can be made of cast steel quite as fit for the purpose intended as those usually constructed of wrought iron, and that they can, at the same time, be made in such a manner as to avoid the uncertainty inevitably associated with large iron forgings, owing to the large number of weldings necessitated in them. Although there is no doubt that very successful steel castings

have been made by each of the three makers referred to as being engaged in this trade—namely, Messrs. Jessop & Sons, of Sheffield; Messrs. Spencer & Sons, of Newburn-on-Tyne, and the Steel Company of Scotland, Glasgow—it is strange that such diverse opinions and practices prevail at these works, and perhaps equally strange that such opposite opinions are held upon the question of large forgings, both in iron and steel, experience of which has been obtained from the practice of many years.

A free ventilation of these opinions and of the practices adopted among technical persons cannot fail to be useful. At the works of Messrs. Jessop, for instance, the opinion is held, and the practice is in accordance with this opinion, that, in order to insure a definite composition of the material with the precision which is necessary, and to obtain thorough homogeneity throughout a large casting, it is absolutely necessary to melt the steel in crucibles. The material put into each crucible having a definite composition, it is claimed that the resulting fluid steel remains of identically the same composition; while the opinion is held that if steel is melted in large masses in a Siemens furnace, although the resulting metal may be sufficiently homogeneous for plate purposes, it is not sufficiently so for many structures where absolute homogeneity and freedom from internal molecular strains is required in every part. At the other works, on the contrary, the opinion is held that homogeneity may be obtained in metal melted in Siemens furnaces. Messrs. Spencer and Sons use both crucibles and open-hearth furnaces to melt their steel, the size of the castings being their only guide in this matter, and they find absolutely no difference as to material, whichever process is used; while the Steel Company of Scotland use the open-hearth furnaces for every purpose. Messrs. Jessop and Messrs. Spencer both seem to hold the opinion that the requisite composition of the resulting steel, to insure not only strength and ductility, but also solidity and soundness, can be obtained by careful attention to the materials employed. At the works of the Steel Company of Scotland, however, the process is essentially that known as the *Terre Noire*. The metal is melted in an open-hearth Siemens furnace, a bath being formed of a mixture of manganese pig iron and steel scrap by melting these materials together. Successive additions of hot steel scrap are then made until the bath contains a sufficiently low amount of carbon to give the resulting product the hardness desired. There is then added an amount of alloy called silicide of manganese, which insures the solidity of the steel and its freedom from blow-holes, the metal being finally tapped into a ladle and run into molds in the usual manner. Throughout the operation the greatest care is taken to prevent oxidation of the metal as far as possible. No ore is used, as the company, being large makers of steel plates, always have available a large quantity of mild steel scrap of definite composition.

The plan of using a compound of iron, manganese and silicon, as is always done at these works, in place of the older method of using glazed iron—which is iron and silicon without any manganese—is held to be preferable for the following reason: When glazed iron—or iron and silicon—alone is used, a portion of the silicon is oxidized by the small amount of oxygen which the metal has taken up, forming a silicate which is very difficult of fusion even at a steel-melting heat; consequently, a certain amount of slag is left intimately mixed with the iron, and metal thus made is composed of particles of metal separated from each other by a very thin coating of film of slag. This renders the resulting metal very "short" and brittle, and no amount of subsequent annealing completely rectifies it. On the other hand, when an alloy of silicon, iron and manganese is used, a compound slag is formed, into the composition of which the manganese enters. This is very fusible at a steel-melting heat, and rapidly rises to the surface of the metal, leaving the metal itself perfectly free from slag. Whichever process is used for obtaining molten steel, great difficulties have to be overcome in successfully making castings of any but the simplest forms. The high temperature required in order to give the metal sufficient fluidity necessarily causes the castings to have a large contraction, which not only is the great cause of "piping," since steel castings cannot be "fed" like other castings, but in order to prevent fracture of the casting while in the mold, great judgment is required in making the mold sufficiently fragile to yield under the contraction strain, and at the same time to give it a sufficiently rigid surface, and make it sufficiently strong to withstand the wash and pressure of the metal while it is fluid. The temperature, too, is so high that it is difficult to find a material suitable for facing the molds refractory enough to withstand the temperature and at the same time avoiding chemical action on the metal used. When the casting is satisfactorily obtained, great differences of opinion are held as to the necessity for or the utility of annealing. At Messrs. Jessop's the opinion is held that the careful cooling of the original casting, so as to insure a uniform cooling throughout, is the only means of insuring molecular equilibrium and freedom from internal strain, and that any subsequent heating must necessarily be far from uniform, the outer and thinner portions being first heated, and that this want of uniformity of temperature produces molecular strains in the material which subsequent cooling, however carefully performed, cannot entirely remove. All other steel makers, however, consider that the cooling which takes place in the mold cannot be so uniformly performed as to leave the casting free from molecular strains, while even if this could be done, the rigidity of the mold itself must necessarily create some molecular strains, and they consider that the only way in which these strains can be set at rest is by careful annealing. The annealing process here meant is not a decarburizing one, no chemical change being produced in the material, but it consists of slowly and uniformly raising the temperature of the casting to a bright red heat, keeping it at that temperature for a length of time, dependent upon the form and dimensions of the casting, and then slowly and uniformly cooling it.

M. Poulcel, of *Terre Noire*, attaches great

importance, not only to annealing, but also to tempering castings in oil, in order to give them a greater degree of ductility. He contends that the metal in castings—especially those of a complex character, with abrupt terminations and changes of form, cast in a sand mold—cannot be of a uniform nature. In castings comprising various degrees of thickness the thin sections of metal must cool more rapidly than the thick ones, and besides setting up strains, this varying rate of cooling causes a difference of crystallization in the various parts, and that to such an extent that uniform crystallization and molecular equilibrium in such castings cannot be entirely obtained by merely annealing, which is effectual for this purpose in ordinary plain castings. Tempering, or in other words cooling, the castings in oil is, however, very beneficial. The first application entirely transforms the large crystalline grain of the metal into a finer and more homogeneous grain, while each successive repetition further adds to its homogeneity, tenacity and ductility. As an illustration of this, I had four specimens cut from a casting made at *Terre Noire* and tested under my own supervision. The first specimen, in the same condition as when cut from the casting, broke with a tensile strain of 32.07 tons per square inch and an elongation of 16 per cent. in a length of 5 inches; the next specimen, which was annealed, broke at a stress of 33.7 tons per square inch, having an elongation of 17 per cent.; the third specimen was annealed and tempered in oil, and broke at a stress of 38.6 tons per square inch, having an elongation of 17 per cent.; and the fourth specimen, which was twice tempered in oil, broke with a stress of 41.1 tons per square inch, with an elongation of 15 per cent. The specimens can be seen on the table, and on examination of the fractures it will be observed that the structure of the material is very much closer and finer after each annealing and tempering. It must be remembered that the molecular strains induced through irregular cooling are not peculiar to steel—they occur in all castings, and although in brass and gun-metal castings the ductility of the metal is sufficiently great in comparison with the contraction in cooling to warrant these strains being practically ignored, yet in cast iron the want of ductility is such that complicated castings are probably never made without being "drawn," while it is absolutely impossible to cast many forms in iron; and even with all the ingenuity obtained from long years of experience, it is not by any means uncommon for large cylinders and other marine engine castings to be actually fractured in parts before being taken out of the mold. Even in forgings these strains are sufficiently severe to cause actual rupture in cooling—for instance, the cavities or so-called flaws often found in the center of large couplings forged with shafts are due to the fact that the outer portion of the coupling first cools and becomes comparatively unyielding, and in the subsequent cooling the contraction of the inner portion, being prevented from taking place radially by the strong cold outer portion, draws the metal asunder at or near the center. It will, no doubt, be interesting to note some of the objects which have been successfully made in this country from cast steel. [Plates illustrating stern frames, rudders and stem pieces, such as are now being used in the building of merchant steamers, made on Cooke & Mylchreest's patent by the Steel Company of Scotland, W. Jessop & Sons and J. Spencer & Sons, were exhibited.] It may be stated that there have already been about 17 frames made, the largest being about 6 1/2 tons in weight. There will also be found on these plates sketches of crank shafts of very large dimensions, made by the two latter firms, the heaviest weighing about 8 tons, and being some 16 1/2 inches in diameter.

(To be Continued.)

**New York Labor Statistics.**—Commissioner Charles F. Peck, of the new State Bureau of Labor Statistics (headquarters in the Capitol Building at Albany), issues a circular in which he says: "In pursuance of the duties imposed by Section 2 of said act, the Commissioner will cause to be sent out, at an early date, a series of official blanks to be filled up by the person to whom they are sent, and returned to this Bureau on or before a specified date. It is earnestly hoped that all classes of citizens will respond cheerfully, and by a hearty co-operation with the Commissioner assist in accomplishing the great and benign purposes sought to be achieved by the creation of this bureau, in the interest of labor and capital alike. Correspondence and suggestions bearing upon the elevation of the laboring classes are earnestly invited."

**The Public Works of the Dominion.**—A report soon to be issued by the Dominion Government shows that the total amount expended on the public works of Canada has been \$164,000,000, of which \$68,000,000 was expended before and \$96,000,000 after the confederation. The largest portion of this outlay has been made upon railways, the Government having expended \$69,000,000 in the construction of these works, while \$21,000,000 has been granted in the shape of subsidies to various roads. The canals have cost \$42,000,000, of which more than \$23,000,000 has been spent since the confederation; public buildings, \$16,000,000; harbors and breakwaters, \$6,000,000, and light-house beacons and buoys, \$2,000,000.

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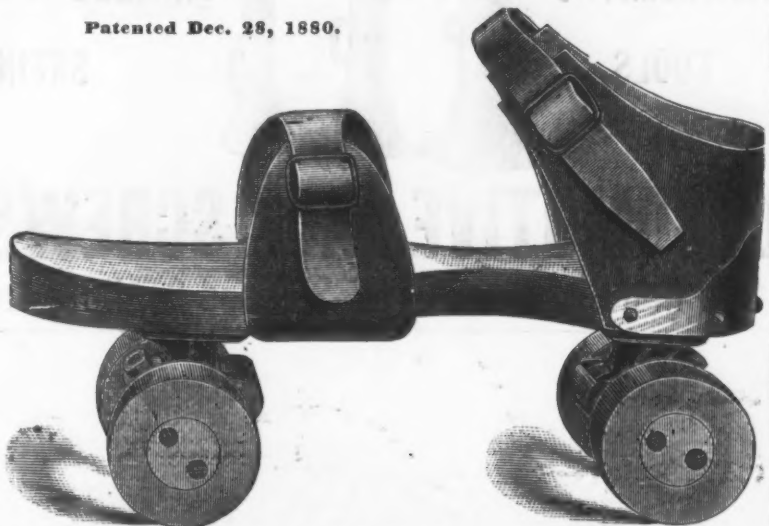
\* A paper read before the recent meeting of the Iron and Steel Institute of Great Britain by Mr. Wm. Parker, Chief Engineer, Surveyor of Lloyd's Register of Shipping.



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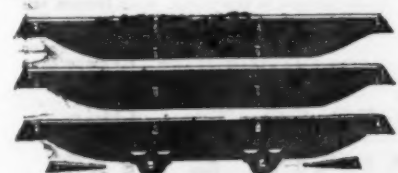
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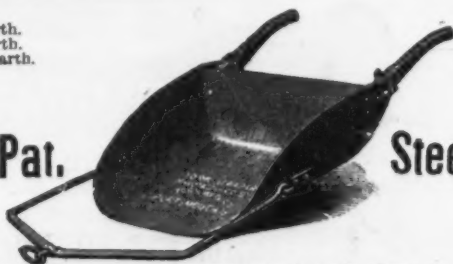
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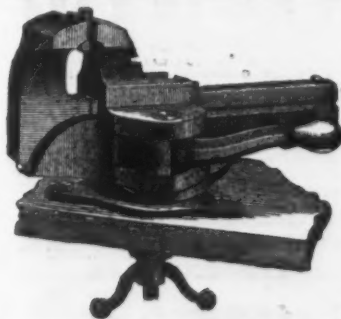
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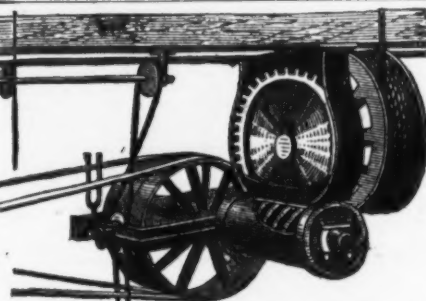
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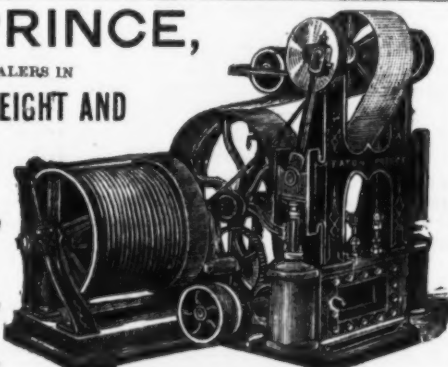
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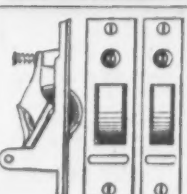
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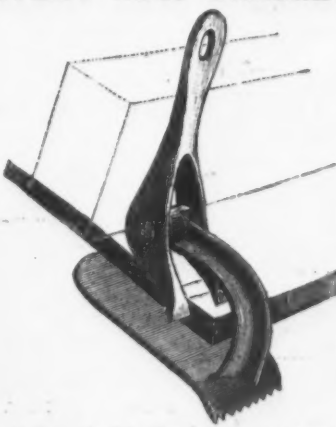
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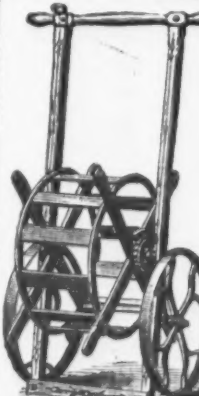
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For the South Atlantic States, cloudy, rainy weather, southwest veering to colder northwest wind; stationary or higher pressure.

For the West Gulf States, fair weather, variable winds, shifting to warmer southerly; stationary or lower pressure.

For Tennessee and the Ohio valley, local rains, followed by clearing weather, winds mostly westerly; nearly stationary temperature and higher pressure.

For the Upper Lake region, partly cloudy weather, occasional rain, winds mostly westerly; stationary or lower temperature, higher pressure.

For the Upper Mississippi and Missouri valleys, partly cloudy weather, occasional rain, variable winds, mostly westerly; stationary or higher temperature and pressure.

For the Lower Lake region, partly cloudy weather, with local rains, winds mostly westerly; stationary or higher temperature and pressure.

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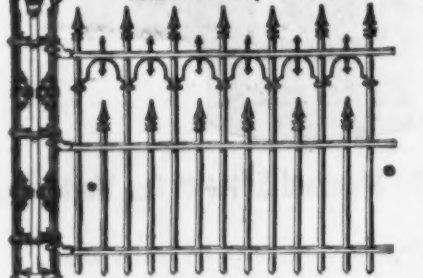
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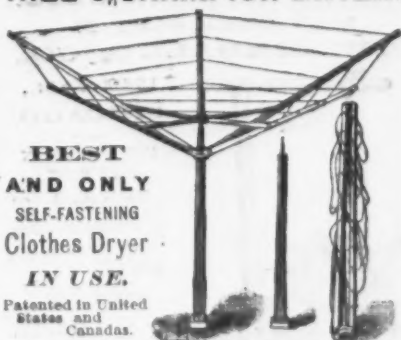


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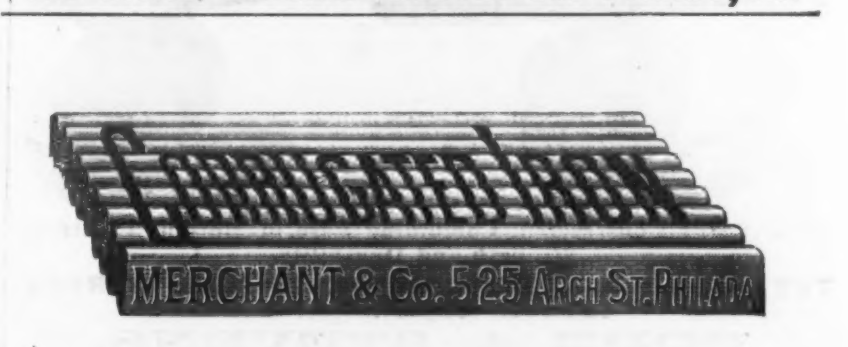
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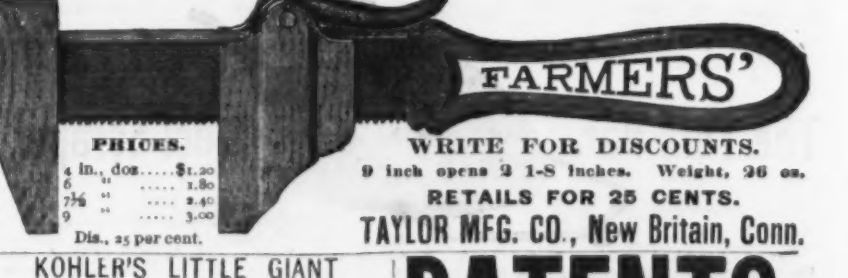
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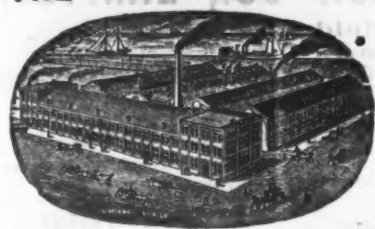
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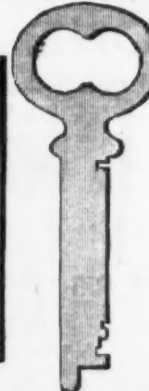
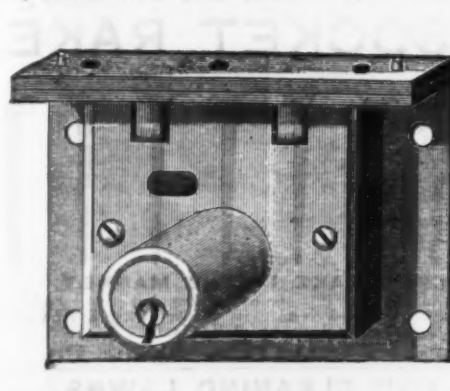
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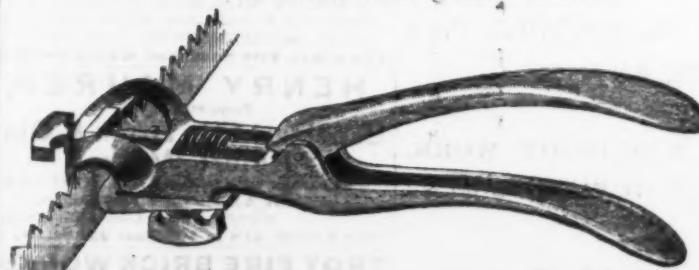
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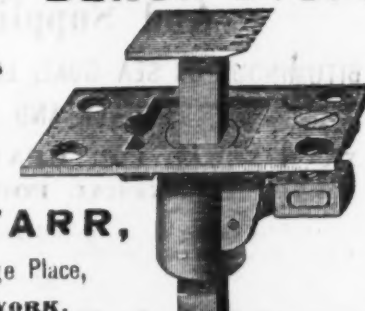


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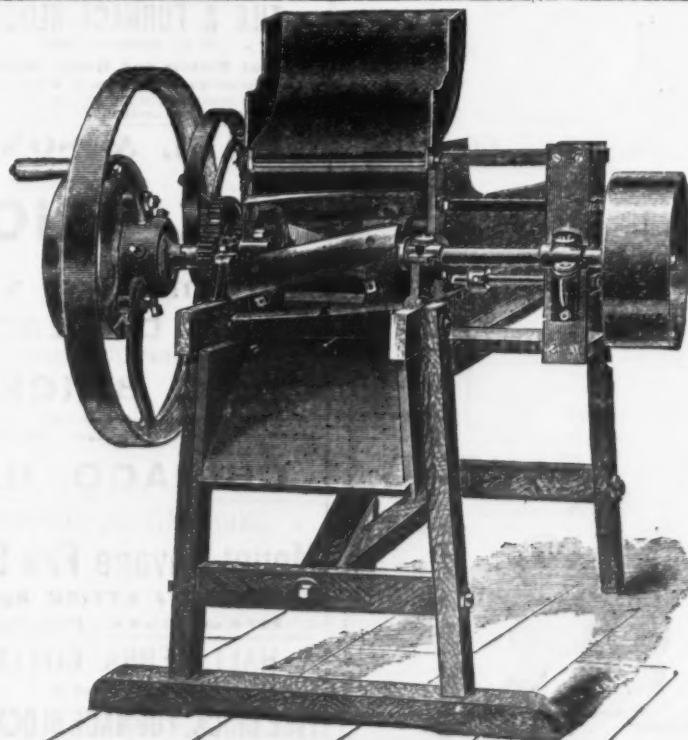
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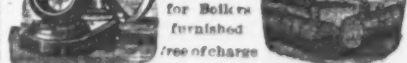
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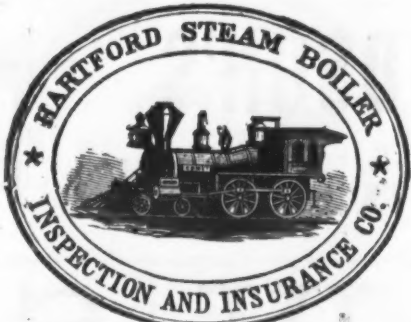
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Island Kaolin.

Established 1864.

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OF ALL SHAPES AND SIZES.

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Offices, 80 & 81 Astor House, New York.

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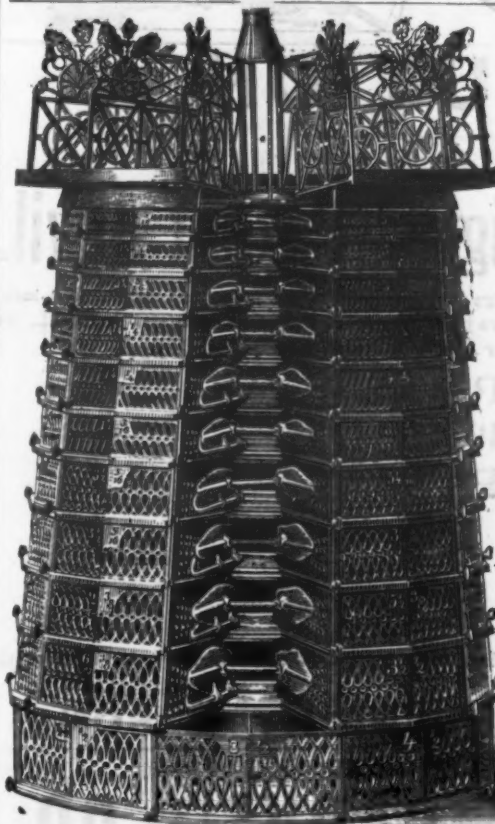
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MANUFACTURERS OF  
"WOODLAND" BRAND FOR STEEL FURNACES OF ALL KINDS, BLAST FURNACES AND  
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grade of brick. Also, Fine Ground Clay to lay brick.



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Independent Revolving

Shelves

AND SELF-LOCKING

**BOLT CASE.**

For all goods of heavy weight, such  
as Carriage, Tire, Stove and Machine  
Bolts and Screws, Taps, Set-Screws  
and Washers, this structure stands  
unequaled. The case, as presented,  
has 88 compartments, each one, as  
designed—full large—to hold 50 or 100  
Bolts, as they come in papers. The  
top ornament forms a rack for 1/2 and  
3/4 Bolts, from 3/4 to 16 inches in  
length. Ten papers, 50 each, any  
numbers or letters, to suit goods to  
be placed in Case, can be ordered at  
my expense, and I will have them  
stamped from Sheet Brass to fit Card  
Rack of Case.  
Height (exclusive of top ornament),  
33 inches.  
Diameter (at bottom), 28 inches.  
Diameter (at top), 21 inches.  
Every Case is shipped at my risk,  
and if not all I claim, can be returned  
at my expense, and I will thank you.

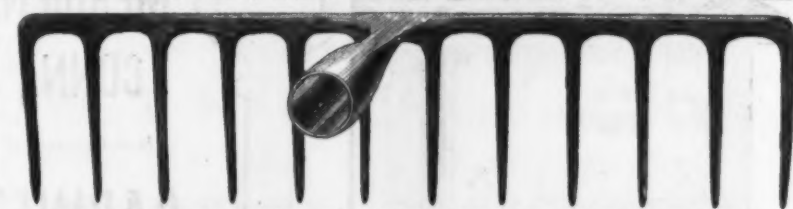
We also Manu-  
facture Screw and  
Shot Cases.

FOR SALE BY

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**KEYSTONE SOCKET RAKE.**

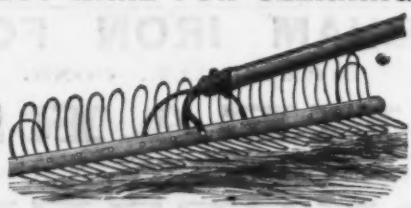


**THIS IS THE ONLY SOCKET RAKE IN THE MARKET.**  
It is made and molded by a new process, and we know it is one of the strongest and best articles  
of the kind manufactured. It is of the very best malleable iron and best quality of live ash handles.  
We make three sizes, 10, 12 and 14 teeth. Send for Catalogue and Price List.

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**A PERFECT RAKE FOR CLEANING LAWNS.**

**The Davis Lawn Rake**



Patented, December 17th, 1874.

The teeth of this Rake are so formed that it is impossible to tear the grass or injure the lawn in  
any manner. As a stable and general purpose Rake it is unequalled. No implement made so com-  
pletely fills the immense demand for a lawn cleaner. For sale by Jobbing, Hardware, Implement and  
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MINERS AND MANUFACTURERS OF

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Steam Packings,  
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Mill Board,  
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Cement Felting,  
Pipe and Boiler Coverings,

Cloth, Yarns, &c.

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2 LAWRENCE POUNTNEY HILL, LONDON, E. C.

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No. 148,656. Date, March 17, 1874.  
**E. BLAIR, Manufacturer,**  
BUCYRUS, OHIO.  
Beware of Infringers who are offering imita-  
tions and will come to grief.

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**J. M. SCHOONMAKER,**  
MANUFACTURER AND SHIPPER OF  
**CONNELLVILLE COKE.**  
Capacity of Mines, 2500 Tons Daily.  
Siding connections with all lines of Railroads.  
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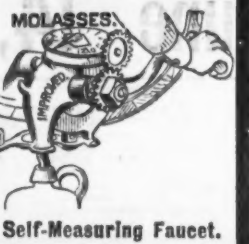
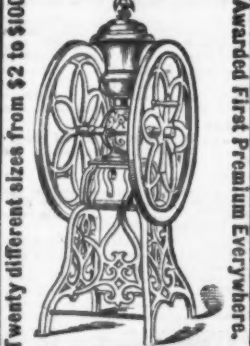


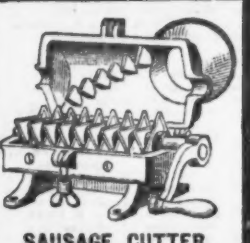

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 Fruit, Wine & Jelly Press.	 SAUSAGE STUFFER.	 Self-Measuring Faucet.
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These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, case-hardened throughout, and not only combine all of the superior qualities of our Cylinder or Gas Pipe Wrenches, but also all requisite combinations of a regular Nut Wrench thus making a combination which has no equal.

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Adjustable Jaw.  
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ADAPTED TO ALL KINDS OF VISE WORK.

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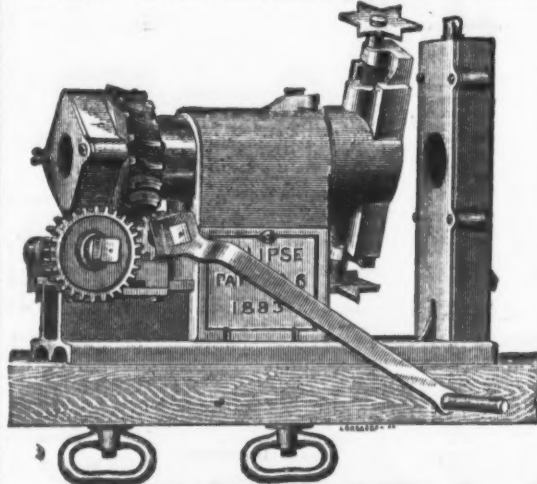
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**COVERT MFG. CO.,**  
West Troy, N. Y.

Sold by all leading Jobbers in General and Saddlery Hardware.

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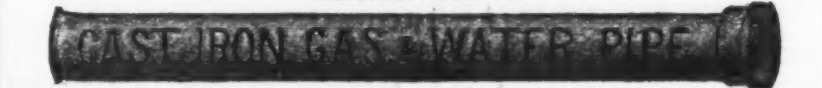
This Tool possesses all the advantages of the larger size "Eclipse" Machine, and is so similar in its general construction that the description of that tool will serve for the "Junior" also. It meets the requirements of those who have use for a screwing Machine light enough to be readily carried about, sufficiently powerful in its gearing (15 to 1) to work easily, and strong enough to bear rough usage. All of these points, with the very important one of MODERATE COST, are to be found in the "Junior" Eclipse Machine.



It will cut off and thread Pipe from 1/4 to 4-inch, inclusive; can be erected on any fence, box or plank in five minutes by simply boring two 1/4 holes, and weighs complete, about 125 pounds. It has no complicated parts and nothing to break or get out of order, and will do the work of a tool costing twice its price. We offer it, as also the large size "Eclipse" (cutting pipe 2 1/2 to 4 inch), with the understanding that if not found satisfactory after a fair trial it may be returned to us within thirty days and the purchase money will be refunded.

PRICE, Complete with Dies 1-4 to 2 inches, \$60.

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MANUFACTURERS OF



Also Flange Pipe, for Steam or Water, of all sizes used. Special Castings, such as Branches, Bends, Reducers, Sleeves, &c. Stop Valves, Fire Hydrants, Retorts, Lamp Posts, &c.

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WIRE AND IRON WORK OF EVERY DESCRIPTION.  
Send for Catalogue, stating your wants, and we will make estimate.  
Mention this paper.

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**Henderson's Patent Gas Furnace,**  
Realizes Perfect Utilization of Coal as Fuel,  
PRODUCES INGOT IRON FREE OF CARBON and  
INGOT STEEL OF ALL GRADES OF CARBON,  
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<p><b>CHAMPION HOG RINGER</b> RINGS and HOLDER. Only device known for ringer rings. The only Ring that will effectively keep rings from rusting. No sharp points in the nose.</p>	<p><b>EAGLE BILL CORN HUSKER</b> is the best Husker in the market. Farmers say it is the best. Use no other.</p>	<p><b>BROWN'S HOG AND PIC RINGER and RINGS.</b> Only single Ring in the market that closes on the outside of the nose. No sharp points in the nose to keep it sore.</p>
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Ringers 75c. Rings, 50c. 100. Holders, 75c. Huskers, 1.00.  
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## The Improved Coal Oil (Kerosene) Vapor Torch.

For the past four years thousands of these lights have been in use in the largest foundries, rolling mills and shops, and for a large and brilliant light, economy of fuel, durability and cheapness, they are the best. Guaranteed all we claim them to be. Sold at manufacturers' prices.



Send for Circulars, Testimonials and Prices.  
Address  
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MANUFACTURERS OF  
THE BEST REFINED

**TOOL STEEL**

AND OTHER FINE GRADES OF  
**CAST STEEL.**

**CANTON STEEL WORKS,**  
CANTON, OHIO.

## PERFECTION WINDOW CLEANER.



Simple, Useful & Durable.

Saves 75 per cent. in time and labor over any other method.

This is the only perfect Glass and Window Cleaner yet devised. It has

## TWO RUBBER STRIPS,

One an elastic cleaning edge, the other a yielding cushion or support. Has hollow iron handles to attach to pole.

We own all the Patents

embracing any or all of these principles, and shall prosecute parties found infringing, either by manufacture or sale of any other Rubber Window Cleaner.

Buy only the PERFECTION,  
and you escape all infringements. See that our stamp and dates of patents are on every cleaner.

**PERFECTION WINDOW CLEANER CO.,**

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**UNION BOLT AND NUT WORKS.**  
**THOMAS PARKES,**  
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OF ALL KINDS.  
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Of all description.  
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OF All Kinds.

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Special for Machinists, Carpenters, Farmers and Glass Cutters consumption hand and set in order.











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Special Finest CAST STEEL WIRE.  
Market Steel Wire, Prime Coppered Spring Wire, Tempered and Untempered Steel Wires, in Long Lengths, for Crinoline, Corset, Lock and Brush Makers, and all Special Purposes.

ALL KINDS OF FURNITURE SPRINGS.  
IRON, STEEL, & RAILS of Every Description.  
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Shipments in bond from American Ports, and direct from Europe to all parts of the World.  
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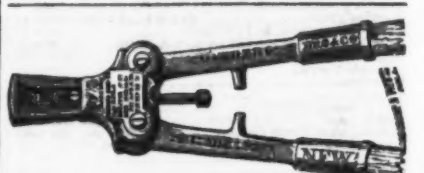
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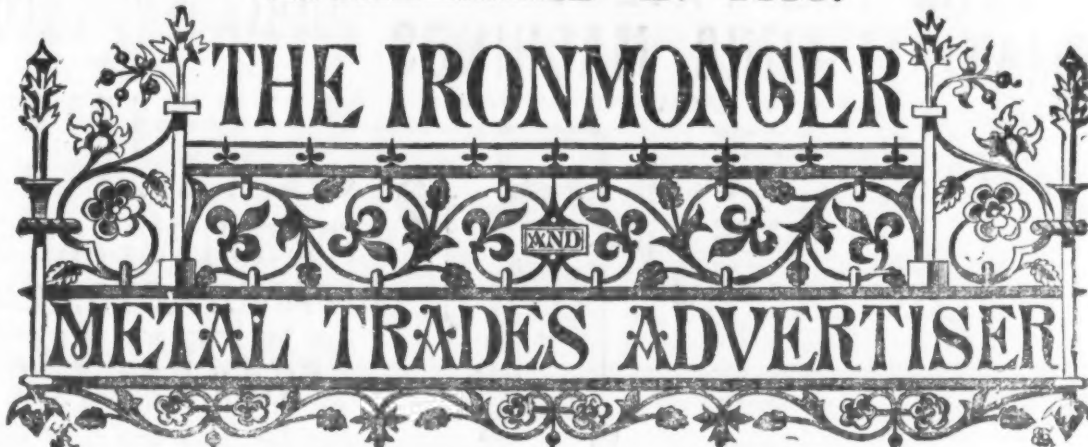
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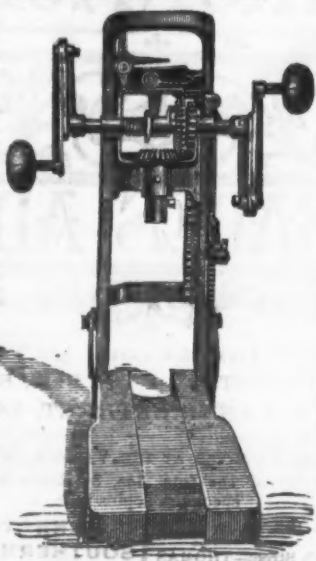
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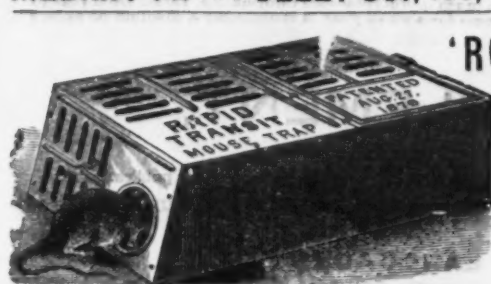
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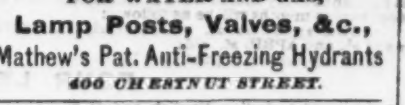
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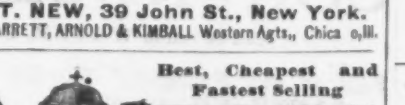
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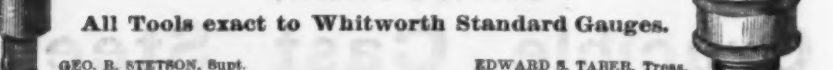
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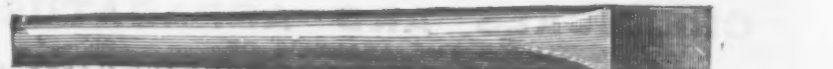
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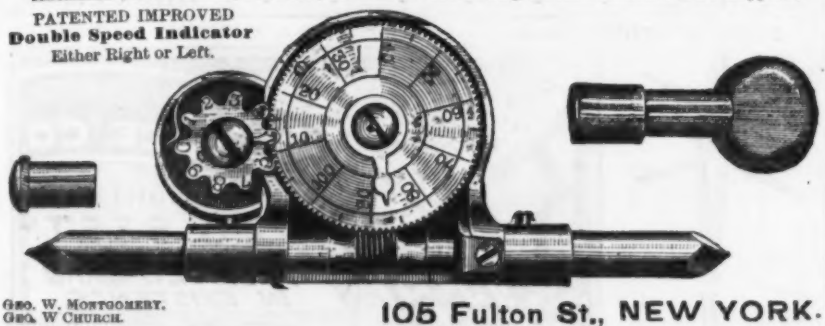
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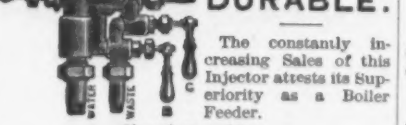
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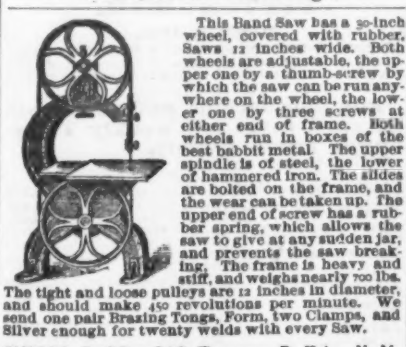
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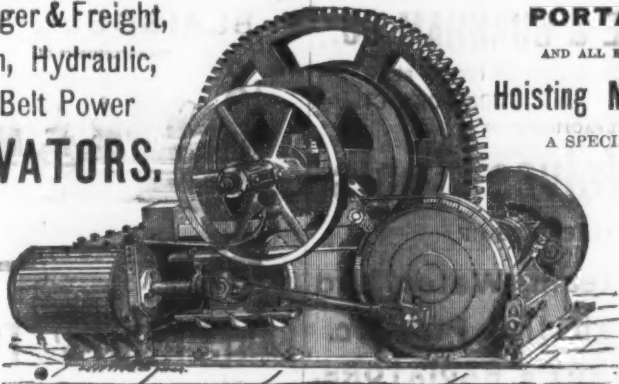
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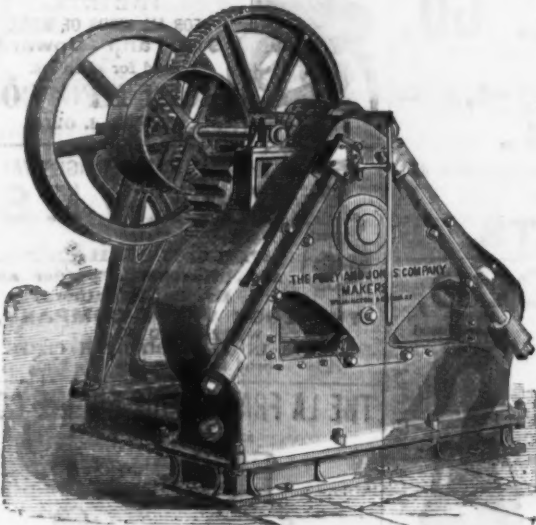
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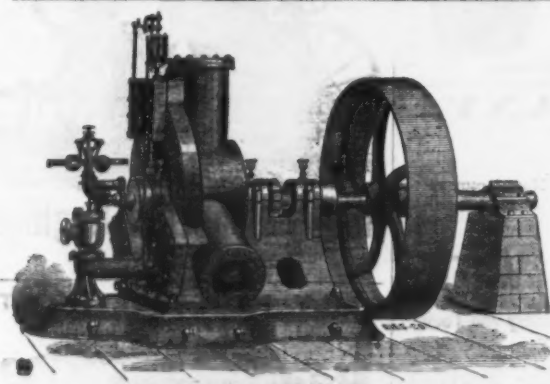
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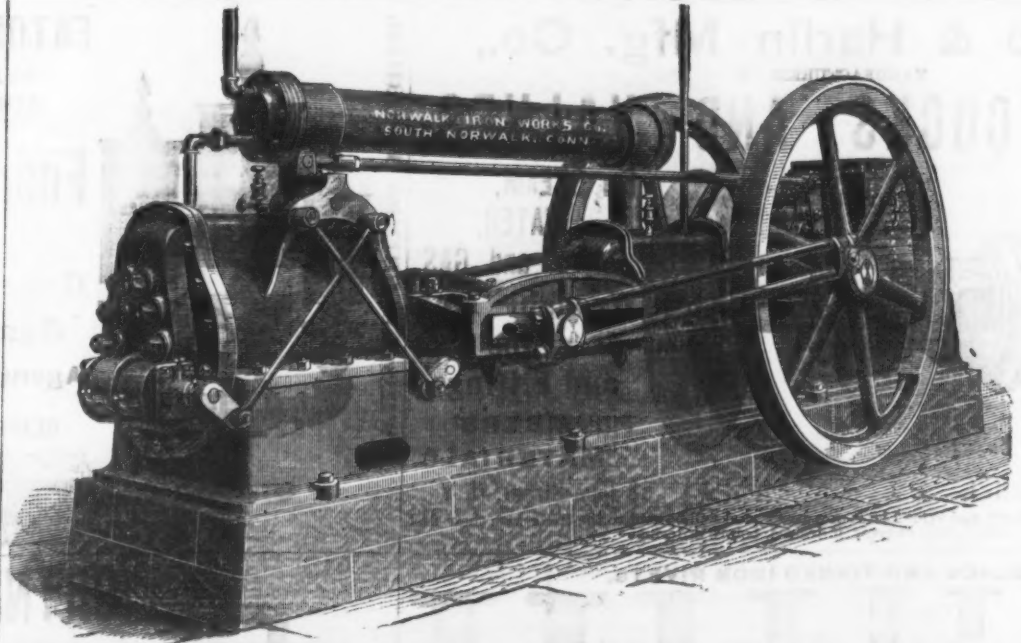
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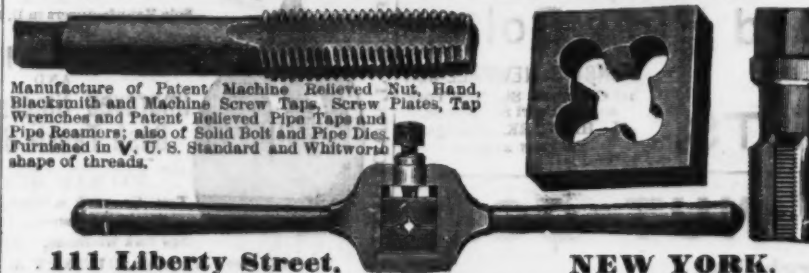
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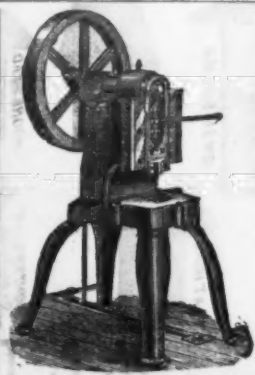
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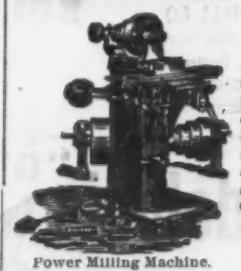


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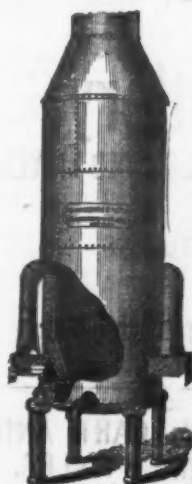
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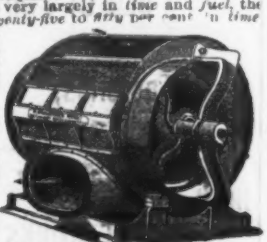


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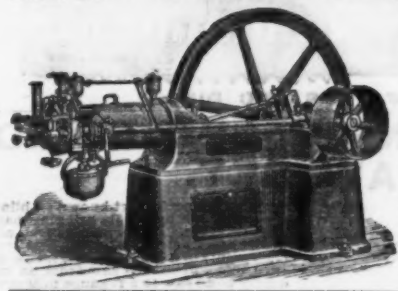
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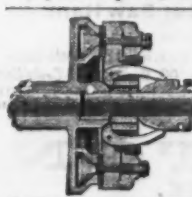
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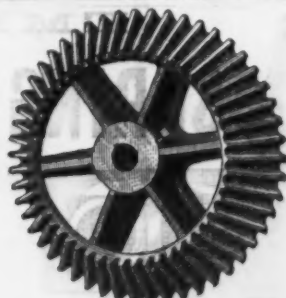


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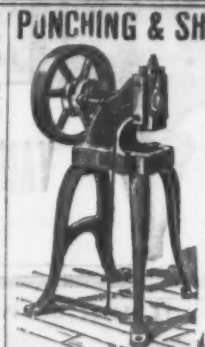
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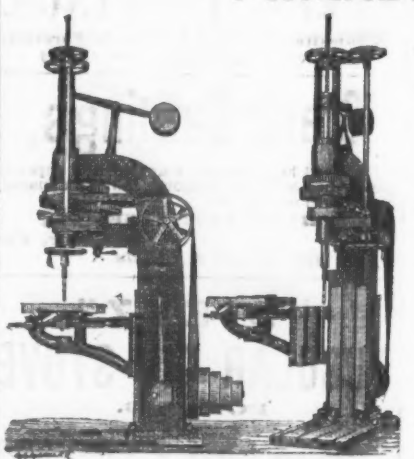
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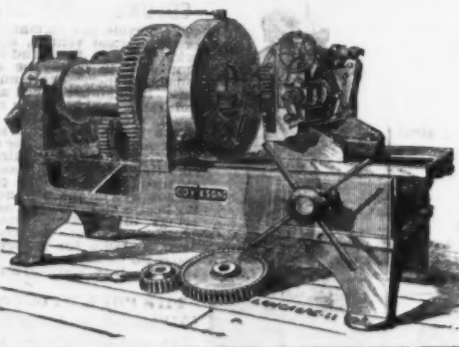


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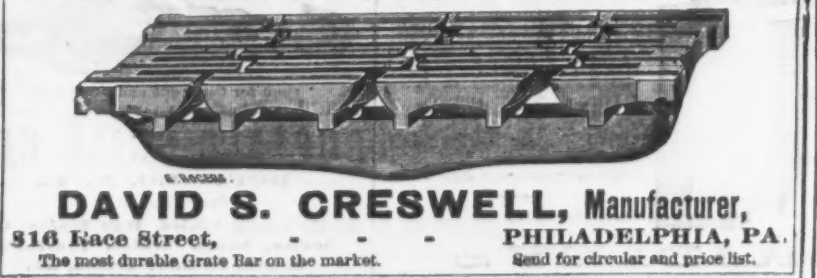
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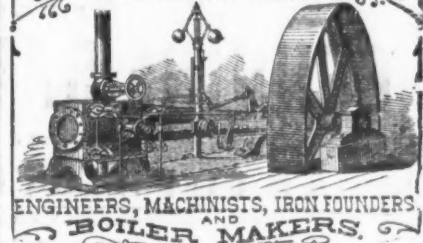
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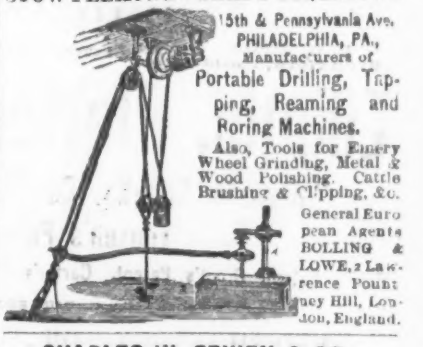
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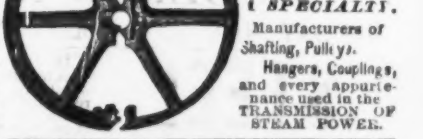
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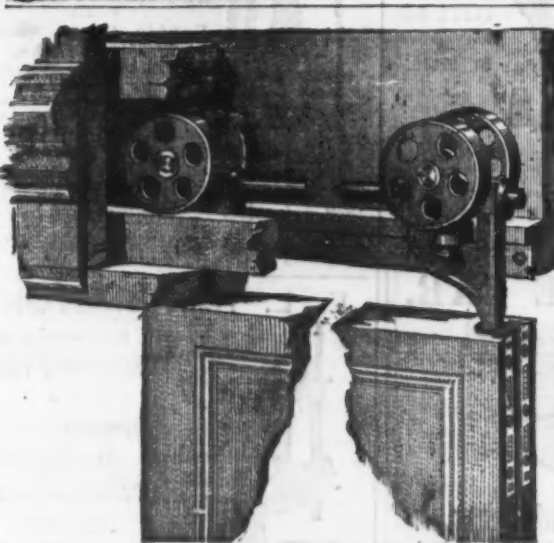
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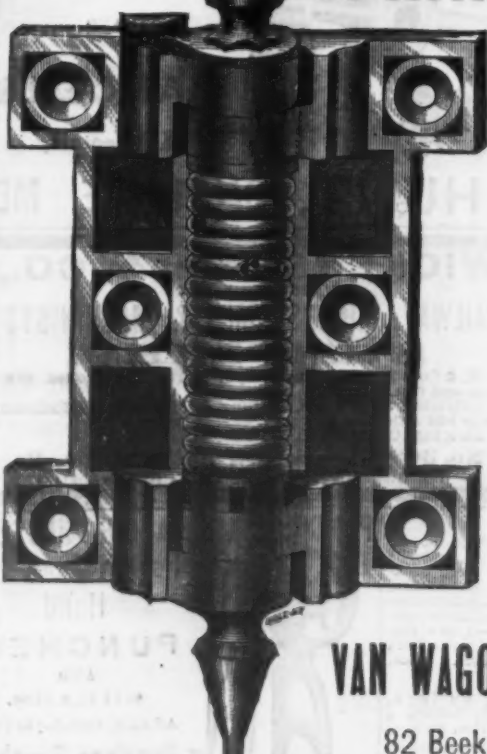
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